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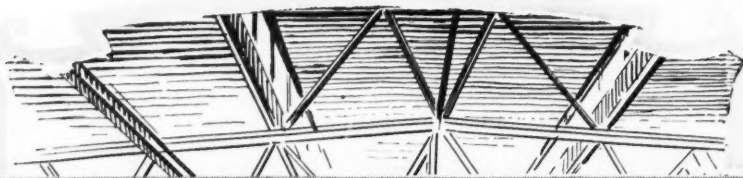
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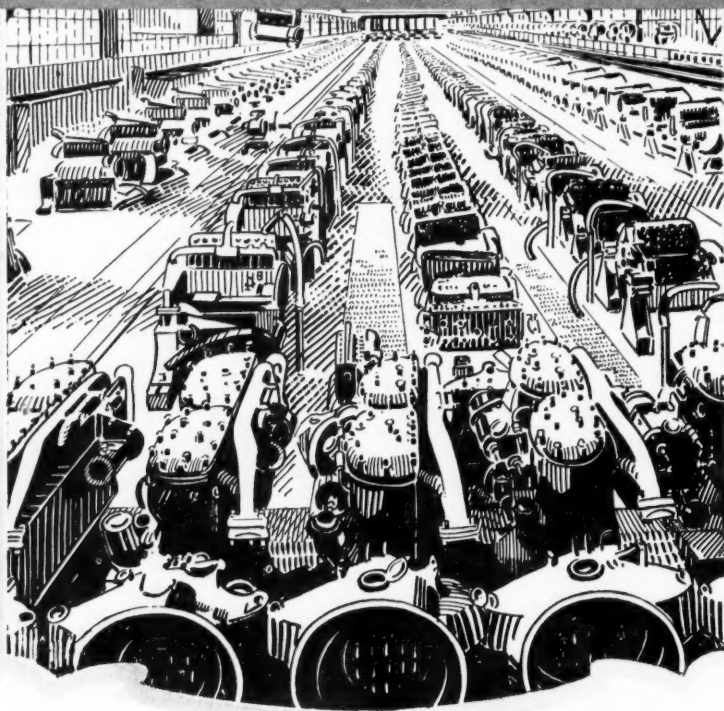
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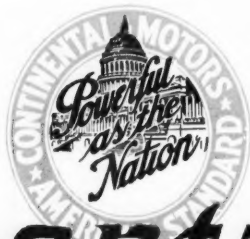
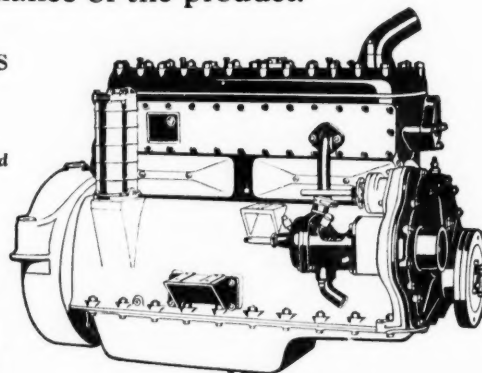
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Continental Motors

Price Competition is Lowering Parts Makers' Profits

*Volume-at-any-price policy which some companies have
pursued is reflected in 1926 balance sheets.*

Pressure from car makers still strong.

By Norman G. Shidle

WHILE 1927 opened with an apparent necessity for greater profit per unit for automotive parts manufacturers if adequate net profits were to be obtained, price competition in some lines during the opening months of the year has been so keen as to warrant serious analysis of possibilities for the immediate future.

The brightest light in the picture lies in the fact that during 1926 when only a few passenger car companies were showing any marked increase in profits, some important parts makers selling chiefly for original equipment were able to maintain total net profits at the level of 1925 and in a few cases to increase them materially. This would indicate that sound design, adequate and prompt service, and efficient sales and advertising methods can achieve favorable results for individual parts makers even in the face of a generally competitive situation which tends to force prices and unit profits downward.

To offset these successful records in some instances, however, 1926 figures show profit declines from 1925 levels for a good many important companies supplying original equipment items. Profits for a typical group of parts makers in 1926 disclose a decline of about 7 per cent in 1926 as compared with 1925, even when figures for the tire companies, most of which evidenced material decreases from 1925 totals, are eliminated from the picture.

A group of 13 representative parts concerns may

serve to give a somewhat typical and composite picture of what happened as regards profits last year in the parts field and may form some basis for discussion of what probably lies ahead during the last nine months of 1927. The companies included in the group are Eaton Axle & Spring Co., McCord Radiator & Mfg. Co., Motor Wheel Corp., Briggs Mfg. Co., Mullins Body Corp., Stewart-Warner Speedometer Corp., Waukesha Motor Co., Spicer Mfg. Co., Moto Meter Co., Inc., Timken-Detroit Axle Co., Borg & Beck Co., C. G. Spring & Bumper Co., Timken Roller Bearing Co.

In 1926 this group made net profits totaling \$32,357,446 as against a total of \$34,566,168 in 1925, a decline of a little less than 7 per cent. Out of the group, however, seven companies paraded an increase in 1926 as compared with 1925 while only six showed a decrease. The largest increase in the group was the 60 per cent

advance shown by Waukesha Motor Co., while the greatest decline was one of 35 per cent. The largest single actual gain was one of \$390,000, while the largest single actual loss was one of nearly \$2,500,000. Had this latter company been eliminated from the list, of course, the gains and losses would have been about in balance.

Data showing profit per unit is quite difficult to obtain as regards parts companies both because of the diversity of lines manufactured in particular instances and because of the lack of published production figures in most cases. The figures available, however, indicate

REALIZATION that the limits of rapid and constant increase in volume are being approached and that the profits of the future probably must come from a fair return per unit even if plants are not kept near to capacity operation, is the thing which is concentrating parts makers' attention on the changing economic tides which are swirling about their business.

It becomes more and more evident as we go along that the big job of the year for the parts industry lies in attempting to shift the merchandising emphasis from mere price considerations to those factors of design, quality and service, which, after all, form the fundamental basis of all automotive progress.

that a decline in the profit per unit did take place last year as compared with 1925 even in many of the companies which showed net profit increases. One organization, for example, which showed an increase in net profits of nearly 19 per cent, had a decline in profit per unit of slightly over 26 per cent; its increased profits in other words, resulted very largely from its 58 per cent increase in number of units produced.

Realization that the limits of rapid and constant increase in volume are being approached and that the profits of the future probably must come from a fair return per unit even if plants are not kept near to capacity operation is the thing which is concentrating parts makers' attention on the changing economic tides which are swirling about their business. Two distinct schools of thought are discoursing about the future of the automotive parts maker these days. Their views differ not so much in fundamentals as in approach to the problem.

Supply and Demand

One group sees the parts business being whipsawed into impotency between its inability to get capacity production and the impossibility of making adequate profits without it. No matter how much the trade papers or the individual manufacturers may talk about the necessity for greater profit per unit, this group says, the old law of supply and demand is the only thing that has any bearing on what actually will happen. While supply exceeds demand, price competition is going to continue to be extremely keen, especially among those parts and supply companies which are manufacturing a more or less staple product. Prices of original equipment have been slashed in some lines already this year and this sort of competition can be expected to keep on. The result will be a few failures, some receiverships and probably more mergers. Eventually balance will be achieved between supply and demand, but in the process a lot of people are going to get hurt and the going will be rough in the meantime.

There are plenty of others, nevertheless, who think that through a multitude of small constructive actions and of propagation of sound thinking along merchandising and buying lines, some of the rough spots in the competitive road may be smoothed out and the worse evils of a *laisse faire* policy offset.

To begin with, they point out, the car manufacturers have some very definite reasons for refraining from beating down parts prices to permanently unprofitable levels. Vehicle builders today see more vividly than ever before the desirability and necessity of stable, permanent sources of supply and most of them realize that such sources cannot be maintained unless a fair profit is realized on each of the parts bought. Then, too, the more far-seeing among car executives do not look with favor on the idea of too many firms being eliminated or merged in the parts field, because this movement, carried far enough, would reverse the present situation and probably cause high prices through demand being greater than supply. The usefulness of the unit parts maker in handling the production of certain units for "trial balloon" models also is coming to be understood better by car manufacturers and greater reliance is being placed on parts makers in this respect right now than at any time for a good many years back.

During the past several years some parts makers, in order to strengthen their positions, have added new lines.

It is not to be expected, of course, that car makers are going to organize a movement to have parts prices increased. They are going to take every price advan-

tage possible just as any buyer does in any line of business. But there are evidences that some producers at least are looking a few years ahead in their relations with parts makers, despite the fact that the pound of flesh attitude still is common in many divisions of the industry.

Greater stress on design and quality features of parts also is being urged as a means of laying emphasis where it should be under present sales conditions. One parts manufacturer claims to be having no trouble whatever as regards getting an adequate profit per unit because, he contends, he keeps improving his design sufficiently to have always something a little better than what is common practice and something which the makers want. "If you do your design job exceptionally well and produce something that the car makers need and will want," he says, "you always can get a fair price for it. Design is the big thing."

However difficult use of this idea may be for certain types of parts and supply companies, it undoubtedly has meant money in the till for a number of concerns. Among the companies cited above are several which have made excellent profits last year in spite of severe and constantly increasing competition.

The parts makers, it is contended in some quarters, are really responsible for bringing upon themselves many of their present price difficulties. While car makers are pushing for lower prices, the pressure from that source hasn't been any more severe than at many times in the past. Some current price slashings, it is contended, are the result of a mad scramble by parts builders to keep production up.

The result in most cases, of course, simply has been corresponding cuts in competitive lines with little permanent advantage to the original price cutter and with the resulting level of prices for the particular type of product just stabilized on a lower level than before.

After all, who is getting or is going to get the benefit of further price reductions in parts?

As pointed out, few benefits seem to be accruing to individual parts companies. Temporary merchandising advantages, of course, have and are being obtained, but rarely are the immediate "pickings" great enough to compensate for the long subsequent period in which everybody is selling on the new low scale and the competition is keener with profit margin less.

A Vision of Big Profit

The car manufacturer, it might be argued, must be reaping a harvest from the price competition which is rampant in many parts of the supply field today.

As a matter of fact no such thing is happening. The records of the last few years show only too plainly that it has not happened in the past. The car manufacturers have not reaped profits at the expense of the parts makers, generally speaking, whatever may have occurred in isolated instances. Far from it; the figures of the past indicate clearly that the whole industry is afflicted with about the same ailment—too much reliance on quantity output as the sole means of getting an adequate net, and not sufficient attention to the task of getting a good profit per unit without plants being operated at maximum capacity.

The car manufacturer almost always has passed on parts price cuts to the public in one form or another. Most often he has passed them on in actual reductions in the list price of the vehicle; sometimes he has passed them on in a better product at the same price. But, filled with the same reverence for the Great God Quantity and haunted by the economic formula that "the lower the price the wider the market," the car manu-

facturer usually has gone out and handed over to the public practically all of the savings he has obtained through lower parts prices and often some more besides.

While there is no certainty that policies of the past in this regard will be continued in the future, there aren't any very strong indications that they will not be. If the future trends follow along the lines of the past, present disturbances in the price structure of the parts field will later be followed by further price cuts on the completed vehicles. There again, as in the relation between competitive parts makers, the advantage gained by the first car maker to cut is likely to be only temporary, the final result being stabilization of the whole price class on a lower level with narrower margins of profits for all the companies in the group.

Again the public will be the beneficiary and the parts maker, the car maker, the car distributor and the car dealer—the whole automotive industry in fact—will once more be seen in the role of Santa Claus.

It isn't to be denied that the policy of passing economies on to the public in the form of lower-priced cars has been a vital factor in building the industry up to its present position. Nevertheless, there is a limit to everything and a safety line will have to be drawn somewhere. Apparently we are very close to the line right now.

It is neither possible nor worth while to try to determine whether the car maker, the parts maker himself, or the distributor or dealer, is primarily responsible for the generation of those forces which have been squeezing profits per unit smaller and smaller in the auto-

motive industry for some time past. The fact is that the trend has been definitely in that direction and that the public, not any part of the automotive industry itself, has been the real beneficiary in recent years.

The public already is getting more for the dollar it puts into motor vehicles than for the dollar it puts into almost any other commodity as compared with pre-war standards. The automotive industry can well afford to put current savings in production economies and elimination of distribution wastes into its net profits' pocket instead of tossing them into the laps of the ultimate consumers in the vain hope of gaining great returns from a temporary merchandising advantage.

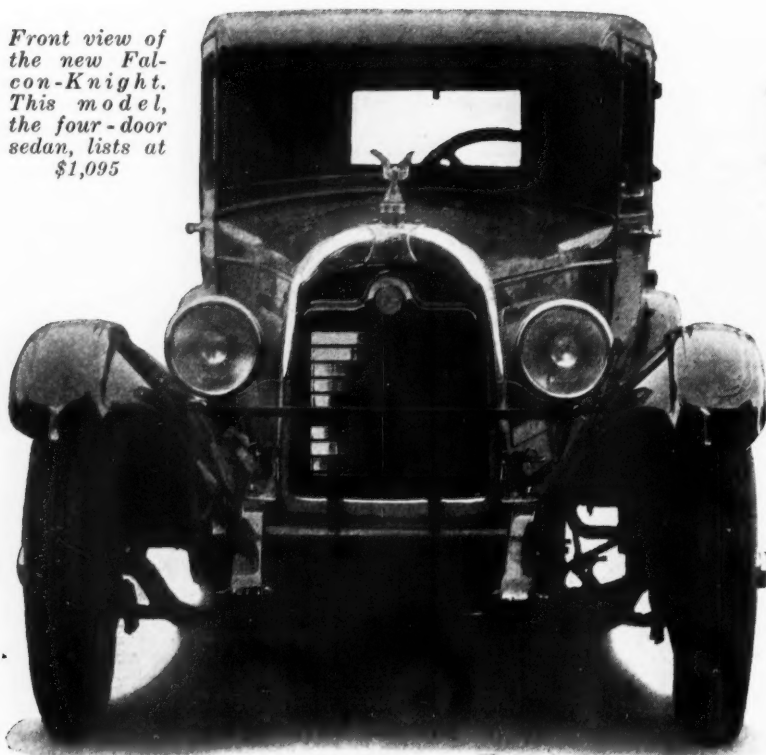
Generalizing about the parts field always is particularly difficult because of the breadth and variety of the field as well as because of the relatively small amount of data readily available about many concerns. The 13 companies chosen for analysis as a group in the early part of this article probably provide a reasonably good cross-section of the more important automotive parts concerns, but even so, the results obtained from that analysis alone can be taken only as qualitative rather than quantitative in character.

However that may be, it becomes more and more evident as 1927 goes on that the task of the year for the parts industry, as well as for the car makers, lies in attempting to shift the merchandising emphasis from mere price considerations to those factors of design, quality and service which, after all, form the fundamental basis of all automotive progress.

Where the 1927 Fishing Will Yield the Best Returns



Front view of the new Falcon-Knight. This model, the four-door sedan, lists at \$1,095



New Falcon- is Now in

*First sleeve valve-engined car
Line at present consists of*

Car assembly operations are conducted at a new plant erected at Elyria, Ohio, while the main offices housing the executive, sales, service and general business departments of the company are located in the Majestic Building, Detroit, Mich. Several well-known executives in the automobile business are connected with Falcon Motors, Inc., of which John A. Nichols, Jr., is president. Mr. Nichols was vice-president in charge of sales with Dodge Brothers, Inc., before forming his own company.

FALCON MOTORS CORP., Detroit, Mich., went into production this month on the new Falcon-Knight car which has been developed to compete in the low-priced six-cylinder field. A dealer organization has begun to function and the car is being advertised to the public as the first sleeve valve-engined job to sell for less than \$1,000. Two body styles, a two-door brougham and four-door sedan listing at \$995 and \$1,095 respectively, form the initial production, while according to present plans a four-passenger roadster, landau-sedan and two-passenger coupe will be added later.

Further details of the mechanical construction of this car, which was previously described in brief form in *Automotive Industries* of Jan. 15, are now available.

Some of the features of the Falcon-Knight are: a shock absorbing member in the clutch drive; steering spindles mounted on double roller bearings; engine equipped with water thermostat and oil rectifier, and mechanically operated four-wheel brakes of the internal three-shoe type. The bodies are of composite construction and employ an integral sun visor formed by a continuation of the roof. They have a low appearance yet provide adequate room. Body interiors are finished in a velour upholstery, satin-nickel effect hardware and walnut garnishings.

A brief review of the specifications of the new car show it to be powered with a high-speed, small-bore Knight engine of 2 15/16 x 3 7/8 in. bore and stroke, capable of developing 46 brake hp. at 2800 r.p.m. Piston displacement is 157.6 cu. in. A conventional single-plate clutch with special rubber insert for cushioning the drive and a three-speed transmission are formed in unit with the engine, while the drive to the semi-floating spiral bevel rear axle, having a ratio of 5.11 to 1, is through two metal universal joints and a tubular propeller shaft. The Bendix brakes operate internally on 11 37/64 in. diameter drums on all four wheels with the hand brake effective on the rear wheels only. The wheelbase of the car is 110 in.

Introduction of a sleeve valve-engined car to compete in the \$1,000 field has been possible, it is said, only by concentrating on mass production of Knight engines. In the past, Knight-engined cars have been built in moderate quantities and were confined to the middle and higher-priced classes. With the installation of a large quantity of special equipment at the engine plant in Pontiac, Mich., it has been possible to materially increase the number of engines produced in this factory with a resulting decrease in Knight engine building costs, which in turn allows the completed car to be offered at a lower price.

Speed of Sedan 60 m.p.h.

According to Falcon engineers, the sedan with a full complement of passengers, will maintain a constant 60 m.p.h. rate, although its top speed is higher than 60 m.p.h. It will accelerate from 5 to 25 m.p.h. in less than 8 sec. and can be turned in a radius of 40 ft. Due to special design of the engine support brackets there are no noticeable periods of vibration while the layout of the springing system insures exceptionally comfortable and steady riding at all speeds. A unique form of design in the method of securing the steering spindles allows very easy steering when parking or in cold weather.

In the matter of design, the Falcon powerplant follows the practice which is employed by other users of Knight engines for passenger cars. The powerplant itself is attached to the frame at four points, the rear members being specially formed to absorb the torque reactions and reduce vibration. In this respect the pressed-steel rear engine arms are inclined backward at an angle of approximately 45 deg. and are secured to the frame by another bracket which projects from the side rail at a corresponding angle. The compression ratio is 5.5 to 1.

The cylinders are cast en bloc and are fitted with water jackets extending their full depth, which is equivalent to the length of the piston travel. At the

Knight Car Production

*to sell for less than \$1,000.
two closed body styles.*

same time, the water is forced to circulate completely around the cylinder heads by means of baffle plates formed in the head cover. The water pump formed in unit with the four-bladed fan is bolted to the front of the cylinder block and is driven from the crankshaft pulley by a V-belt. At the water outlet in the cylinder head a thermostat is installed.

Seven main bearings of the bronze-back, babbitt-lined and replaceable type support the drilled crankshaft which is placed in static and dynamic balance. Particular care has been exercised in the manufacture of these engines to eliminate any possible sources of vibration and in addition to the fully balanced crankshaft the flywheel is balanced while the connecting rod assemblies complete are matched to within $\frac{1}{8}$ oz. of each other. The diameter of the main bearings is $2\frac{1}{4}$ in. with the size of the connecting rod journals $1\frac{7}{8}$ in. With the employing of seven bearings for the crankshaft the maximum distance between any of the main bearings is $2\frac{9}{16}$ in., which insures positive alignment at all times.

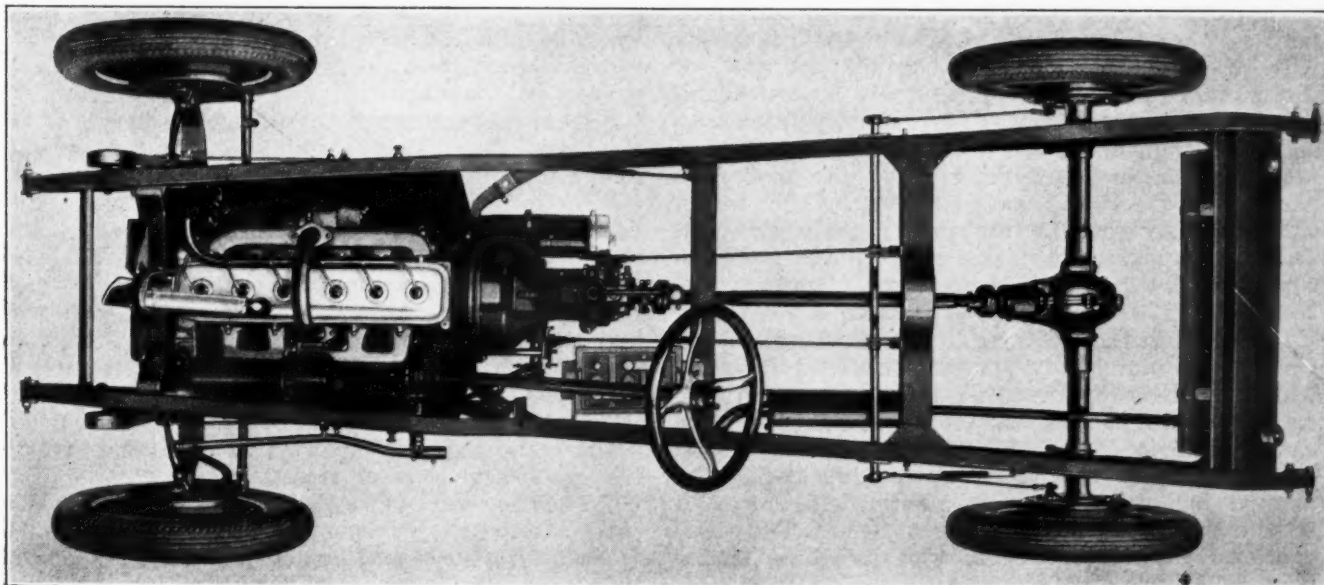
Connecting rods of conventional I-section are fitted with centrifugally-cast babbitt big end bearings which are finished by broaching and burnishing. At their upper ends the light-weight cast-iron pistons are secured by $\frac{3}{4}$ in. diameter pins clamped in the rods. Three rings of $\frac{1}{8}$ in. width and all mounted above



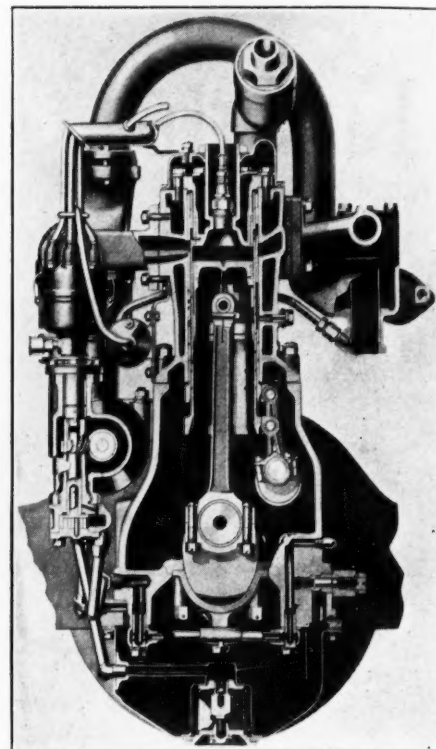
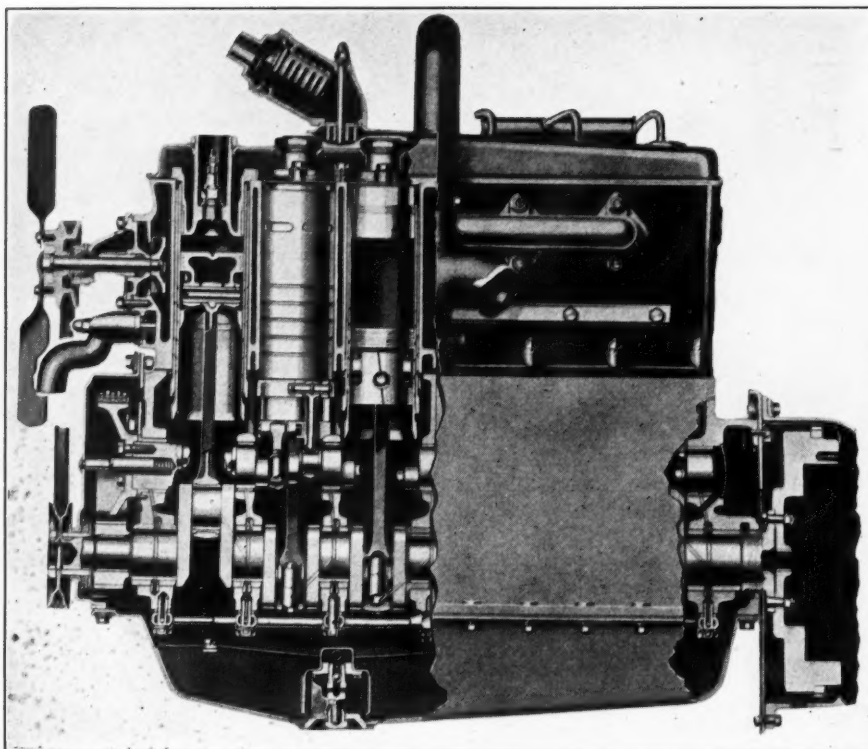
Driver's compartment of the Falcon-Knight, showing arrangement of controls and instruments

the pin are employed, the lowest ring being of the oil control type.

In line with general Knight engine practice, both inner and outer sleeves are driven by short connecting rods from the one eccentric shaft placed on the left side of the engine and carried in seven bronze-back, babbitt-lined bearings. The rods are secured to the sleeves by locking pins finished in the same manner as the wrist pins, while the lower ends of the rods are provided with babbitt bearings centrifugally cast. The cylinders are finished by grinding and honing operations while the sleeves and pistons



Falcon-Knight chassis



Longitudinal and cross section views of the Falcon-Knight engine

are ground finished. The sleeves are so timed that the inner sleeve moves down with the piston power stroke.

Full pressure lubrication is supplied by a gear pump mounted on the outside of the engine and driven by the generator shaft. Both the crankshaft and eccentric shaft are drilled so that oil is supplied under pressure to the connecting rods while the $1\frac{1}{4}$ in. wide front timing chain which drives the eccentric shaft and accessories is also pressure lubricated. Other parts of the engine are lubricated by splash from the connecting rods. Chain wear is compensated for by an idler which automatically takes up the slack. A Skinner oil rectifier is attached to the exhaust manifold on the right side of the engine.

The exhaust from the right side of the engine is led over the center of the engine where it connects with the intake manifold and forms a hot spot for the incoming mixture supplied by a special plain-tube Tillotson carburetor. The latter is fitted also with a centrifugal type air cleaner of the same make.

The generator, distributor and oil pump are mounted on the right front of the engine and driven simultaneously through the timing chain sprocket. The starter, also on the same side, engages with the shrunk-on flywheel gear by the usual Bendix drive. Electrical units are of Auto-Lite make.

Embodied in the driving plate of the Borg & Beck single plate clutch is a special rubber-fabric insert which insulates the flywheel from the clutch hub and provides a smooth and vibrationless drive. The clutch itself is of the fully adjustable type and is provided with a special fitting for lubricating the annular ball release bearing. Formed in unit with the clutch and engine, the transmission is of the conventional sliding three-speed type providing an intermediate ratio of 2.03 to 1, a low ratio of 3.63 to 1, a reverse of 4.83 to 1, with the high gear direct. Both the main shaft and the pocket gear are mounted

on annular ball bearings with the clutch pilot bearing being a bronze self-lubricating bushing. The countershaft is carried on two bronze bushings while the gears are formed of oil-hardened chrome steel.

Drive to the rear axle is through two oil-tight metallic universal joints and a $1\frac{1}{4}$ in. diameter tubular propeller shaft. Propulsion and torque strains are taken by the Hotchkiss drive through the springs. The semi-floating rear axle employs the two-piece built-up housing without truss rods and is secured to the springs by overmounting arrangement. The spiral bevel final drive provides a ratio of 5.11 to 1. At both front and rear the integral pinion shaft is supported on ball bearings while the gear and differential unit is carried on taper roller bearings. At the wheel ends of the $1\frac{9}{16}$ in. diameter shafts, the axles are supported by single row annular ball bearings.

An unusual feature of the I-beam front axle is the mounting of the steering spindle at the top and bottom with adjustable taper roller bearings. By having the load taken in both directions on taper roller bearings, exceptionally easy steering is provided, particularly in cold weather. The axle section is very heavy to withstand the torque of the front wheel brakes while the steering tie rod is equipped with ball type connections. Front wheels are carried on two taper roller bearings. Pivotal steering is provided also for the front wheels by setting the steering pins at an inclined angle.

Unusual rigidity is imparted to the frame through the employment of seven cross members.

Spring movement at the front is controlled by Gabriel shock absorbers fitted as standard equipment.

Artillery wheels carrying 30 x 5 in. 4-ply balloon tires on 20 in. demountable rims are regular equipment. Chassis lubrication is by the conventional pressure gun method.

Used Cars Starting to Annoy Some Foreign Dealers

*Problem not as yet of major importance in many countries
but is beginning to be felt in Australia, England
and South Africa. Spain also a sufferer.*

IN only a few foreign countries has the problem of used cars become of major importance. In general, cars are operated longer by the original buyer than in this country, few dealers have felt the necessity for making acceptance of a trade-in part of a new car sale, and in most of our foreign markets the relatively small number of cars now in operation has been the greatest factor in preventing used cars from becoming a problem of serious proportions.

A survey that was made by the Automotive Division, Bureau of Foreign and Domestic Commerce, covers many of the more important automotive markets in regard to used cars and is of interest because the present situation in the various countries depicts rather accurately different stages through which the industry in the United States has passed in reaching its present condition, with used cars as a very important factor in nearly all new car sales.

In Australia used cars have become of considerable importance. Nearly all large dealers have used car departments, a number of firms deal in used cars only and a few firms are in the used car auction business. Good judgment is being used in making allowances on trade-ins and after being reconditioned, usually in the shops of the distributor, it has been possible to resell them for enough, usually, to make the deal break even, if not to turn up a small profit.

The situation in Belgium is rather unsettled at present, but this is due to currency fluctuations which cause rapid changes in new car prices rather than to anything inherent in the used car situation itself. Fear of decided price changes in new cars has made it almost impossible to sell a used car of any make or type, regardless of age, mechanical condition or original price, for more than \$700 to \$750.

Sales of used cars have held up well in Cuba in spite of the poorest market for new cars in several years.

No difficulty is experienced in Czechoslovakia in disposing of used cars taken in trade and this is particularly true of cars of domestic manufacture as these makes are readily salable as taxicabs.

The recent lifting of the Grecian embargo on cars has not helped sales very much. An increasing number of used cars are being offered for sale due, mainly, to poor taxicab business which, ordinarily, absorbs a great many of these trade-ins.

In Canada the more progressive dealers are installing used car departments for reconditioning and selling trade-ins and the operation of these departments has resulted in much more satisfactory conditions. A steady increase in new car sales has resulted in an increase of the number of trade-ins on hand and many

dealers have had to take losses on their used car stocks since the recent tariff reduction automatically lowered the value of all types of cars.

Increased competition for new car sales with attendant high allowances for trade-ins has considerably increased the stock of used cars held by Chinese dealers in the Shanghai region.

No difficulty is being experienced in handling used cars of relatively low price in India but high-priced makes are tending to pile up in dealer stockrooms.

Long Trade-in Allowances

Overstocked Japanese dealers have sought to reduce their stocks by making long trade-in allowances but there is a good demand for used cars so that no great trouble is being experienced in getting rid of them. The trade-ins are usually repainted and reconditioned.

In the Baltic States no used car problem has yet developed because of the still limited number of cars in operation. In Mexico used car sales are very slow because of lack of money and general business depression.

In Poland the used car market was so active during the last quarter of 1926 that there was some talk about importing used cars. This would be quite impracticable because, as pointed out in these columns some time ago, freight rates and tariffs are based on weight so that these charges as well as percentage of dealer profit would be the same for a used car as for a new car of similar type and weight.

Because of low-priced fuel and oil in Rumania there is a good demand for used cars which usually sell for a higher proportion of first cost than is common in America. Dealers have not found it necessary to accept trade-ins in order to make new sales.

Depreciation of French and Italian currencies has flooded Spain with low-priced light cars and used car values have suffered in consequence.

Dealers in South Africa have adopted valuation scales for used cars to stop over-valuation as a step toward solving the used car problem, which is becoming severe.

The same condition applies to the United Kingdom where the Motor Trade Association has proposed a plan for adopting maximum and minimum trade-in values for all makes and models of cars sold. Once these fair prices have been set the association purposes to protect them by publication of a "stop list" containing names of dealers who disregard the fair prices. In the letter explaining this proposal the association points out that some such action is essential if dealers are to continue in business profitably.

New Four-Speed Transmission Slows Engine Down on "High"

Used with comparatively low rear axle reduction, product of Warner Gear Co. reduces engine noise and vibration at high speeds and effects a saving in fuel.

By P. M. Heldt

A FOUR-SPEED transmission for use on passenger cars and light trucks has been brought out by the Warner Gear Co. of Muncie, Ind., and already is standard equipment on the Paige eight-cylinder passenger car. The transmission has a direct fourth speed and is designed for use with a comparatively fast rear axle reduction.

With this transmission the total reduction from engine to rear axle on high is less than with the conventional three-speed gear on high, with the result that when driving in high gear the engine will run at a lower speed for a given car speed. This means that the car is more comfortable at high speeds, because of the reduced engine noise and vibration; that engine wear and tear is reduced, and that the fuel consumption is cut down. Furthermore, the maximum speed of the car on level road is generally increased somewhat. All of these advantages are obtained at the cost of a slightly heavier and slightly more expensive transmission and of somewhat more frequent shifting of gears.

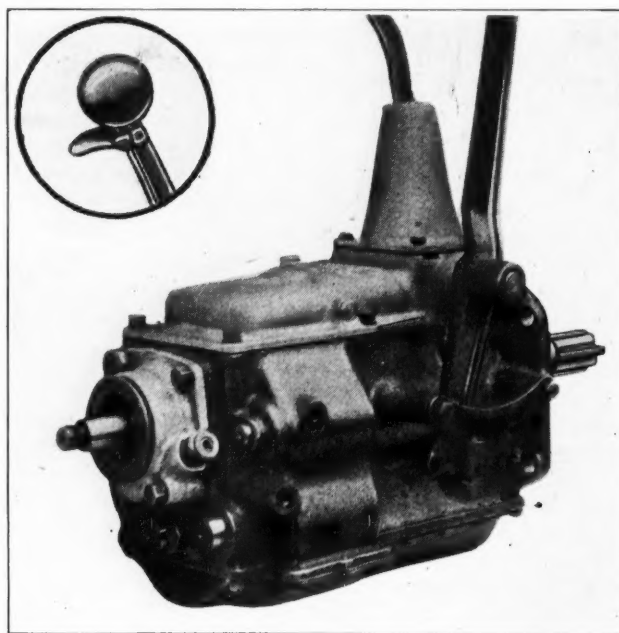
As compared with the conventional four-speed transmission, largely used on heavier trucks and also on passenger cars in Europe, the new transmission has the advantage that the third or next-to-the-highest speed is practically as silent and as efficient as the top gear or direct drive itself, hence there is not the same objection to operating on a geared drive as there is with most of the conventional transmissions.

This third speed is obtained by means of a train of two pinions and two internal gears. The internal gear is inherently somewhat more efficient than the spur gear, because of the reduced amount of sliding at the tooth surfaces, and it has been found also much quieter. This is probably due to a more effective oil cushion, tooth contact, in fact, taking place in an oil bath.

Referring to the accompanying sectional view of the transmission, the clutch shaft *A* extends through a long hub on the forward bearing plate, and at its rear end carries the constant mesh pinion *B*, which latter meshes with the constant mesh gear *C* of the secondary cluster gear which revolves on plain bearings on a spindle fixed in the gear housing. Clutch shaft *A* is drilled out from the rear end and internally splined, and within the hole in it is located the forward end of a floating shaft *D*

which is splined at both ends and also some distance back of the forward end. By means of the forward splines *A* it remains in driving connection with the clutch shaft at all times, although it can be shifted axially a certain distance by means of mechanism to be described. The second set of splines *B* serves to place the floating shaft *D* in driving connection with the third speed drive pinion *E*, while the set of splines *c* at the rear end of the shaft connects it with the tail shaft *F* when the floating shaft is moved toward the rear. In the drawing the floating shaft is shown in the central or neutral position, in which it is connected neither to the third speed drive pinion nor to the tail shaft.

The floating shaft is surrounded by a shell-like member comprising the internal gear *G* and the spur pinion *H* and referred to as a double internal gear. This member is supported in two Hyatt bearings mounted in a bearing support *I* forming a bridge across the main housing. At about the middle of its length the floating shaft is enlarged and has a groove for a shifter collar cut in it. Into the shifter collar groove in shaft *D* fits eccentrically the collar *J* which connects by pins extending radially through longitudinal slots in the wall of the hollow member *G-H* with a grooved collar *K* on the outside of this member. Into the groove of this collar engages a fork *M* mounted on one of the shifterbars.



Warner four-speed transmission. Insert shows ball handle of shift lever with latch handle for reverse

When the floating shaft *D* is shifted forward, the third speed drive pinion *E* is secured to it by means of splines *B*, thus giving the third speed, while if shaft *D* is shifted toward the rear, the splines *c* connect it with tail shaft *F*, and since the floating shaft is at all times in driving relation with clutch shaft *A* through the splines *a*, the tail shaft is then connected to the clutch shaft through the floating shaft, and the drive is direct.

It will be noticed that the tail shaft *F* at its forward end carries the internal gear *L*, with which meshes the pinion *H*. Thus for the third forward speed the drive is from the clutch shaft through the internal combination *EG* to the double internal and thence through the internal gear combination *HL* to the tail shaft *F*. Except when driving on third the internal train runs idly.

Arrangement of Other Speeds

First and second speed and reverse are obtained in the usual manner, except that the secondary pinion for the second speed is located close to the rear wall of the housing and the pinion for the first speed and reverse further forward, which is the reverse of the conventional arrangement. For the first speed the power is transmitted from *B* to *C* and from *N* to *O*, while for second speed it is transmitted from *B* to *C* and from *P* to *Q*.

The tail shaft is carried in a large ball bearing at its rear end and in a Hyatt roller bearing at its forward end and the exceptionally short span between these bearings gives it a very rigid support.

Control of the transmission is by the usual cane-type of shift-lever. The first speed is obtained by pulling the lever over to the left and moving it backward; shifting to second consists in pushing it directly forward from the first speed position. Shifting to third involves returning the lever to the central, neutral position, pushing it to the right and then backward and, finally, shifting to high is accomplished by merely pushing the lever forward from the third speed position.

In all ordinary driving the car is started on second gear, the first being considered merely as an emergency gear. Control is then as described above.

Owing to the fact that the total reduction in sec-

ond gear is considerably greater than in the case of an ordinary three-speed gear and normal rear axle reduction, starting in second can be readily accomplished without much slipping of the clutch.

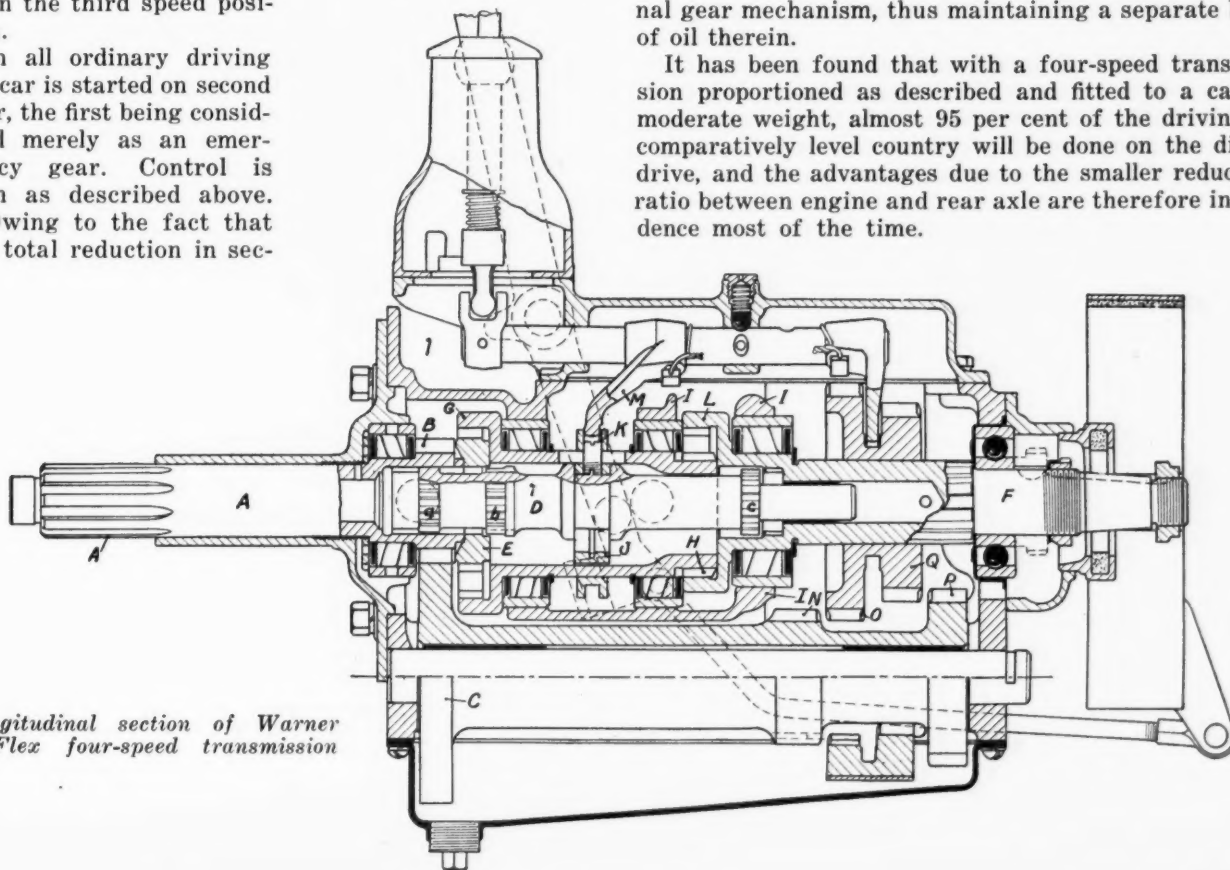
In order to engage the reverse it is necessary to pull up on a latch mounted on the shift lever. This permits of moving the ball handle further to the left than for the first and second speed positions and thus picking up a third shifter bar which controls the reverse gear combination. The reverse position being locked by the latch, it is impossible to engage it by mistake.

The Warner Model T-4 Hi-Flex transmission here described has sufficient capacity for transmitting the power of an engine giving a maximum torque of 175 lb.-ft., and weighs complete without brake, 130 lb. It will be noticed that the bottom of the housing is a pressed steel pan. Such a large pan is used because it permits of introducing the secondary gear cluster from below and inserting its spindle from one end. Seven pitch teeth are used on the constant mesh and the low and second speed gears, while the internal gears have 10-12 pitch teeth. The back-lash between teeth is exceptionally small, which relieves shocks and makes the shift smoother. The splines are of involute form.

The reductions within the transmission are as follows: Low, 4:1; second, 2.46:1; third, 1.42:1, and fourth 1:1. With a gear reduction in the rear axle of 3.69:1 as used in the Paige eight, this gives the following total reductions: Low speed, 14.75:1; second, 9.1:1; third, 5.25:1, and high, or direct drive, 3.69:1.

A special system of lubrication is employed, which insures a constant supply to the internal gears and their bearings, which are housed in. The low-speed driven gear, which is of considerable diameter, dips into the main oil bath and constantly splashes oil onto the walls of the case. On the right hand wall of the case (from the rear) is formed a gutter which catches this oil and delivers it into the housing of the internal gear mechanism, thus maintaining a separate bath of oil therein.

It has been found that with a four-speed transmission proportioned as described and fitted to a car of moderate weight, almost 95 per cent of the driving in comparatively level country will be done on the direct drive, and the advantages due to the smaller reduction ratio between engine and rear axle are therefore in evidence most of the time.



Longitudinal section of Warner
Hi-Flex four-speed transmission

Just Among Ourselves

Business Outlook Promotes Confidence

IT'S encouraging to note the steady growth of confidence among manufacturers and dealers as the first quarter draws to a close. As we predicted last December, total output for the first quarter this year is running behind the first quarter of 1926; just how far can't be determined exactly but it looks as though the decrease would be somewhere between 10 and 15 per cent. Ford's consistent decline has been responsible for a good part of the lower output, although the total for N. A. C. C. companies probably will be a little behind also. Nevertheless, the trend of business of the year has been consistently upward since Chicago show week and so keen an analyst as Leonard P. Ayres says in his last bulletin, "February is normally the slowest business month in the year and if that turns out to be true of 1927 this year will be a relatively prosperous one, for business was fairly good last month."

* * *

March Sales Show Increase

RETAIL sales, while still spotty, are going ahead on the whole, both new and used car volume having showed a tendency to increase all through March. All in all, the course of automotive sales and production is proceeding much along the expected lines, a little behind rather than a little ahead of 1926, but with most makes showing satisfactory business and a few recording marked increases. After a few drastic price reductions several weeks ago, the price situation apparently has stabilized again, the only revisions in lists coming through in the last few days

being minor in character and upward rather than downward. General Motors with a price drop on only one line has made steady gains in retail sales this year as compared with last, indicating that sales stimulants other than price can be made effective.

* * *

Strong Tide Against Further Price Cuts

GUESSING about passenger car prices is bad business for the reputations of prophets, but it can be said with a fair degree of certainty that little basic economic reason for further reductions is apparent at present. Attempts to gain temporary sales advantage by price reductions still may be made in the next few months, but there is a strong tide running against the tendency to sacrifice profit per unit in the hope of getting a permanent volume gain which in the past so often has failed to materialize. Many executives are hopeful that further changes in passenger car prices will not be numerous in the next few months, pointing out that more than one good spring selling season has been spoiled by the injection of a multitude of price revisions.

* * *

Man Works Best When He Does What He Likes

MOST managers in modern industry have come to understand the practical value of trying to put workers onto tasks which arouse some degree of interest and in the achievement of which the employee gets some mental as well as financial satisfaction. Other things being equal, any man will do a better job if he gets

some fun as well as some money out of it. The difficulties of applying this theory practically, however, and the obvious possibilities of training a man to a certain degree of proficiency even in tasks for which he has an active dislike, have led sometimes to a complete cessation of any attempt to work out the idea. Those managers who have kept on trying, on the other hand, often have felt the results fully to warrant the trouble. Benvenuto Cellini attained a fair degree of skill as a flute player despite his violent dislike of the instrument and its music which he pursued only to please his doting father, but he didn't give the world the best results of his abilities until he pursued those arts toward which his inclinations led him. It's a far cry from the art of a Cellini to the drab motions of a machine operator, but within the limitations of the separate spheres and the different personalities, the same psychological principles are likely to be found effective.

* * *

Rubber Pool Getting Results

WE'VE heard several people asking lately how the American rubber pool is working out and what effect its activities are having. That's a little hard for an outsider to judge, but it seems doubtful that the activities of that pool have as yet become very great. Since its inauguration, however, the price of rubber has been fairly stable so that the psychological effect already seems to have been very good. According to one close observer, the mere potential possibilities of the pool have frightened the purely speculative element fairly well out of the market.—N. G. S.

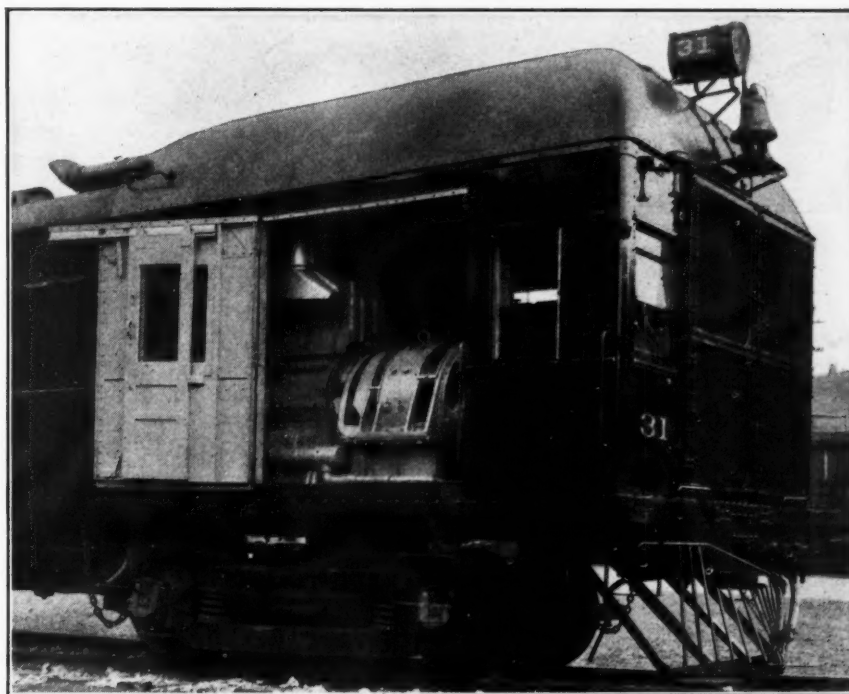
Brill 500 Hp. Gas-Electric Rail Car Handles 300-Ton Load

Two six-cylinder gasoline engines direct connected to 160 kw. generators which supply current to Westinghouse motors on the rear trucks. Built for branch line service on Lehigh Valley.

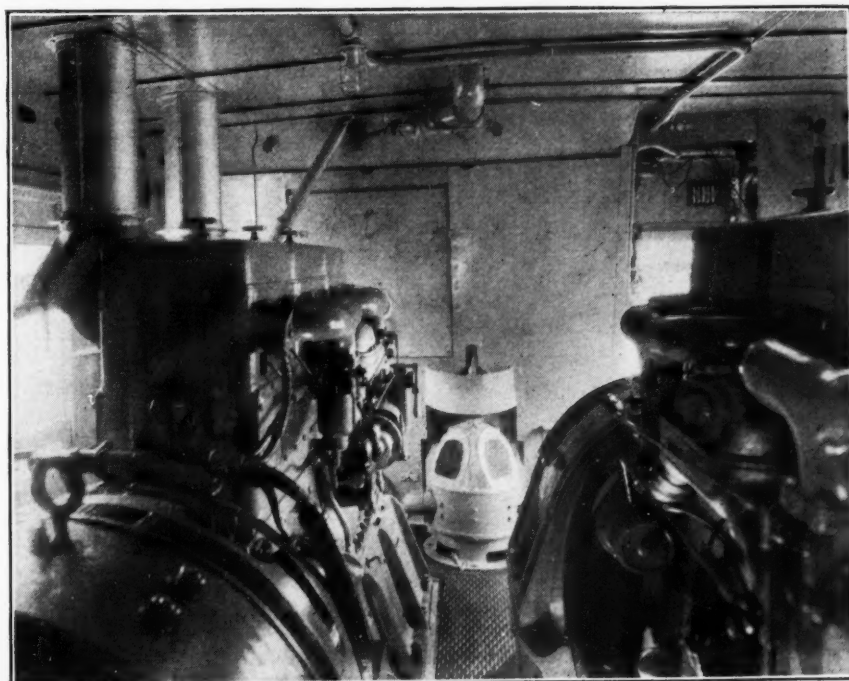
MOTOR-DRIVEN rail cars powerful enough to haul several coaches or other trailers having maximum weight up to 300 tons at good operating speeds over lines containing many sharp curves and grades are a late development of the J. G. Brill Co. and indicate the possibilities which this type of motor-driven equipment has for future use.

Rail cars for branch line passenger and express service have been built for the Lehigh Valley R. R. equipped with two 250 hp. Brill-Westinghouse gasoline engines each direct connected to a Westinghouse 160 kw. generator which, in turn, supplies current to two Westinghouse motors with nominal rating of 140 hp. located on each of the two trucks.

The engine is a vertical, six-cylinder, four-cycle type with $7\frac{1}{2}$ in. bore and 8 in. stroke. It has a governed speed of 1100 r.p.m. at which it will deliver 250 hp. continuously.



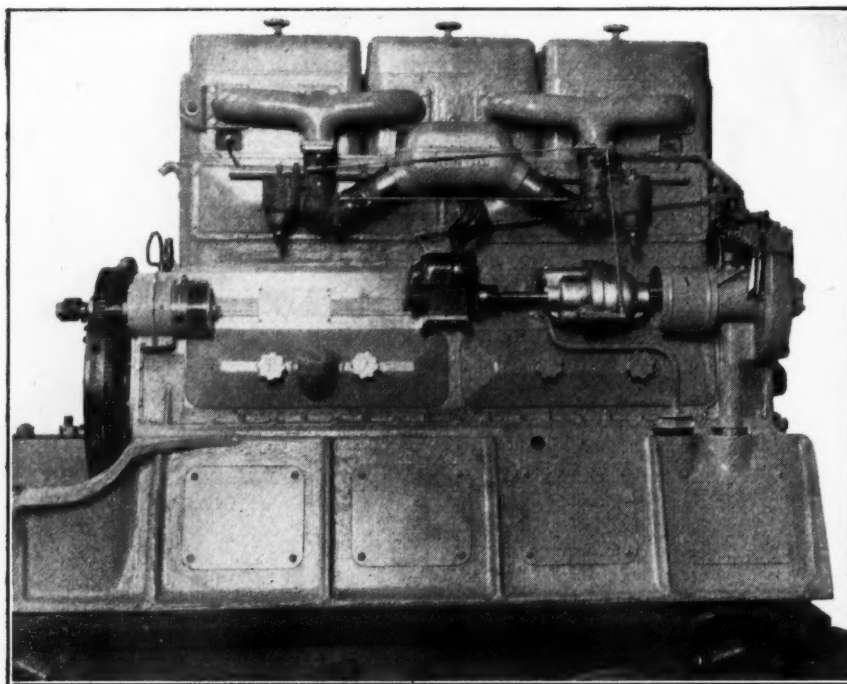
Brill-Westinghouse rail car, showing one of the two 250 hp. engine units. Note radiator in front and exhaust pipe extending back from false roof



The engine is provided with four overhead valves per cylinder, removable cylinder sleeves and a 4 in. diameter, seven-bearing crankshaft. Full pressure lubrication is furnished to all main, connecting rod, camshaft, idler gear and rocker arm bearings. A gear type pump delivers oil under a variable pressure which is at a maximum of 50 lb. under full throttle.

Each of the two engines is connected through a flexible coupling to a 600 volt, 160 kw. generator. The two

Interior view of engine room. To save space the power units are mounted in opposite order. In the front center is one of the blower fans of the cooling system



Close-up of intake side of one of the 250 hp. engines with the generator removed. Two magnetos, one on each side, are provided

units, complete with exciter, are mounted on a common bedplate. The generator demand upon the engine has been made fairly constant by properly proportioning the magnetic circuits and field windings. The exciter is integral with the generator and has its armature on the extended generator shaft. Its duties are to excite the generator, charge the battery and provide part of the energy for lights.

The radiator is located in the front of the car and circulation of air through it is assisted by two fans mounted horizontally in an air chamber behind the radiator which drive the air up through a false roof placed over the front of the car. Fuel is supplied by vacuum feed to two carburetors on each engine from two 150-gal. tanks under the floor.

The cars are 70.5 ft. long and weigh about 130,000 lb.

Each truck is fitted with two 140 hp. motors and each pair of motors is supplied current from one of the engine-generator sets. The motors are applied with the maximum gear reduction, resulting in maximum tractive effort per ampere and, with the high generator voltage available at low current values, permitting high schedule speeds. Cut-out switches are provided so that either motor set may be cut out when necessary.

Westinghouse unit-switch type control is employed. This is electrically controlled and operated pneumatically so that operation of the double power unit equipment is as easy as that of a single unit. The application of power to the motors is controlled by a throttle which also serves as a master controller. When the throttle is first opened it operates a toggle switch which closes the field and line switches. Further movement of the throttle changes the engine speed which, in turn, changes the car speed just as in the operation of gas-electric motor coaches.

Skill Needed to Produce Good Lacquer Job

IN producing a good-looking lacquer job of the highest possible luster the methods used in applying the pyroxylin material and in sanding and polishing the finished surface are mutually dependent. Unless the various coats have been applied correctly it will be almost impossible to obtain good results regardless of the time and energy expended upon sanding and polishing. Similarly, an expert application of the finishing materials may be spoiled, in so far as appearance goes, by inexperienced sanding and polishing operations.

The job of applying lacquer finishes is no longer considered something that almost anyone about the plant can do with no previous training or experience and to this change in practice is due no small part of the greatly improved appearance of present-day cars over those produced in the early years of pyroxylin finishes.

The orange peel effect which at one time was seen as a disadvantage of all lacquer jobs has now almost disappeared and through no other way than better methods of application. So-called blushing or presence of white spots on the finished surface have been almost entirely eliminated by taking measures to eliminate all traces of moisture in the spray lines and by having each coat dried in the order of its application.

Greater cleanliness of the spraying operation has contributed greatly to better finishes. The most minute particles of dust on a car body, when covered by several coats of pyroxylin materials, show up as quite obvious

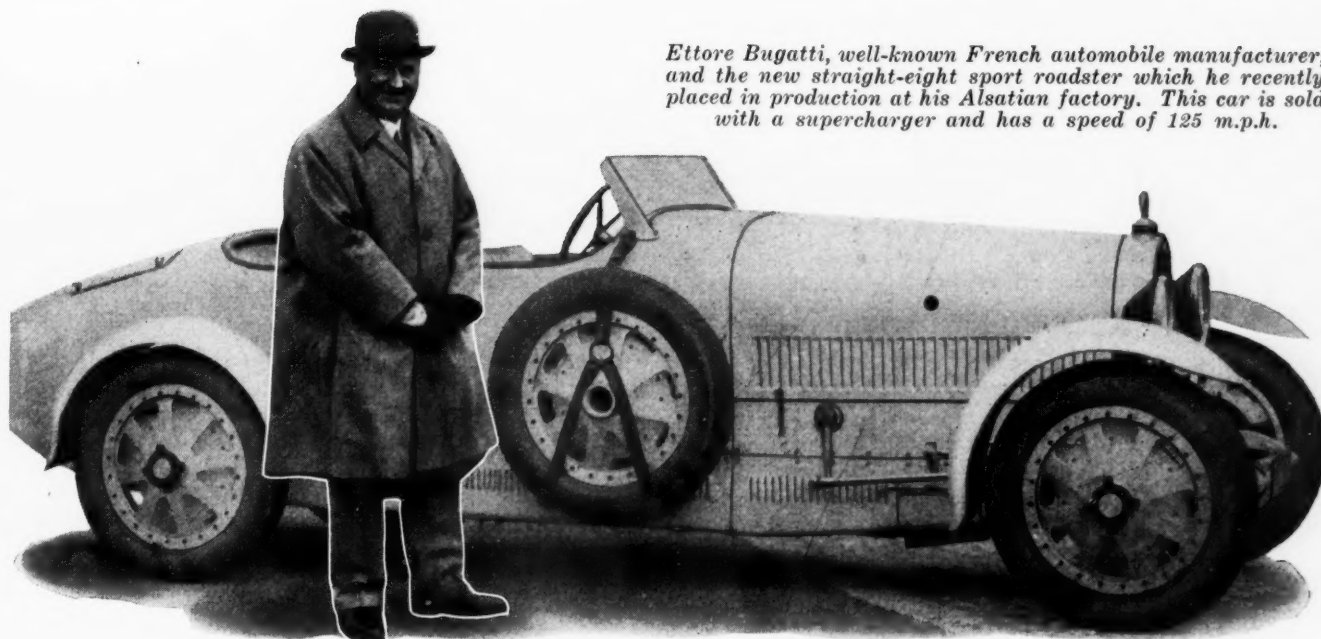
defects and the steps which have been taken recently to control conditions in the room where lacquer is being applied have succeeded in very materially reducing finish blemishes of this nature.

Control of temperature and humidity in the spraying chambers was at first considered unnecessary but now it is known to be essential to first-class jobs. Every detail of equipment and conditions affecting the job of application must be considered most carefully if the final result is to be up to expectations.

When all these precautions are taken and the actual application is made by a workman who is capable of applying an even coat of material free from runs, sags or other blemishes, the work of the sanding and polishing gang is considerably lightened but its work still is very important and must be carried on with care.

To a certain extent the sanding and polishing operations must depend for their success upon the judgment of the workmen. This is true because the needs of individual surfaces vary considerably. All the cars will not have exactly the same amount of material deposited on them, the surface of the metal will vary, and the amount of sanding performed at each step during the progress of the finish will vary and thus affect all other operations.

A regular pressure evenly distributed over the entire surface produces the best finish. Rubbing strokes should be in straight lines rather than circular.



Ettore Bugatti, well-known French automobile manufacturer, and the new straight-eight sport roadster which he recently placed in production at his Alsatian factory. This car is sold with a supercharger and has a speed of 125 m.p.h.

Bugatti Builds 125 m.p.h. Roadster

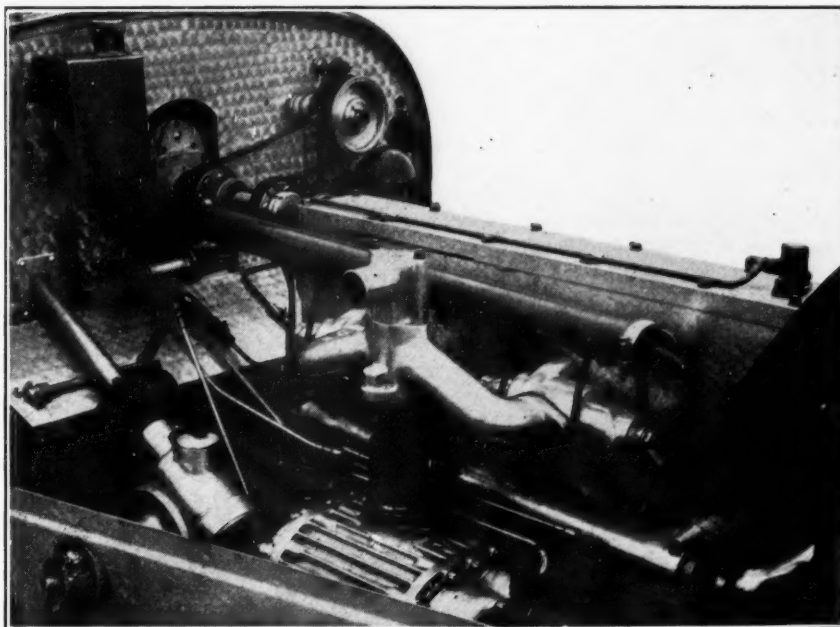
Engine is same as used in racing model and is fitted with supercharger. Body accommodates four passengers.

By W. F. Bradley

ETTORE BUGATTI has just gone into production at his Alsatian factory on a straight-eight, 140 cu. in. supercharged sport roadster for which he claims a top gear performance from 1 to 125 m.p.h. This is the only car in France with a compressor sold to the public by any important maker, although a number of smaller firms are adding compressors to existing cars.

The engine is the Bugatti racing model, but in order to make the car suitable for general use, chassis dimensions have been increased, the track being 49 in. and the wheelbase 117 in. Straight side tires of 28 x 4.95 in. are fitted. With a four-passenger close-coupled body the car weighs 2200 lb. Figures regarding power output are withheld, but the engine is stated to peak at

6000 r.p.m. While claiming that this is the fastest stock car on the market, Bugatti maintains that it is also the most flexible, one of his demonstration features being to start the car in high through the electric starting motor and to attain the maximum speed rapidly without the use of the gears.



Intake side of 140 cu. in. straight-eight supercharged Bugatti engine

The engine is a straight-eight and has a bore and stroke 60 by 100 mm. with cylinders in two castings of four, with a built-up five-bearing crankshaft. The two end bearings are spherical balls, and rollers are used for the intermediate bearings. Each cylinder has two intake valves and one exhaust, mounted vertically and operated by an overhead camshaft. Connecting rods are I-section in one piece with roller bearings mounted

on the crankpins of the crankshaft before assembly.

A Rootes type blower placed horizontally on the right of the engine is driven from the timing gears by a horizontal shaft with two flexible couplings. The blower revolves at engine speed and has the Solex carburetor placed under it and the intake manifold flanged to its upper face. In the head of the vertical stem of the intake manifold is a relief valve to provide for a possible blow-back from the engine. Lubrication of the blower is provided independently of the main supply in the engine from a small auxiliary tank on the dashboard feeding by gravity to the two ball bearings through valves interconnected with the throttle and only opened at a given engine speed. Ignition is by means of a single magneto, mounted on the aluminum dashboard and driven off the rear end of the camshaft by means of a shaft with fabric joints.

Chassis features do not differ appreciably from other Bugatti cars. The transmission is separate and provides four speeds ahead, with a central lever. Springing is by inverted quarter elliptics at the rear and by semi-elliptics in front, these latter going through the hollow circular section, forged front axle, which is delivered nickel-plated. Cast-aluminum wheels, with eight flat spokes, disposed with a slight helice so as to direct a current of air on the brake drums forming an integral part with them are standard fitting.

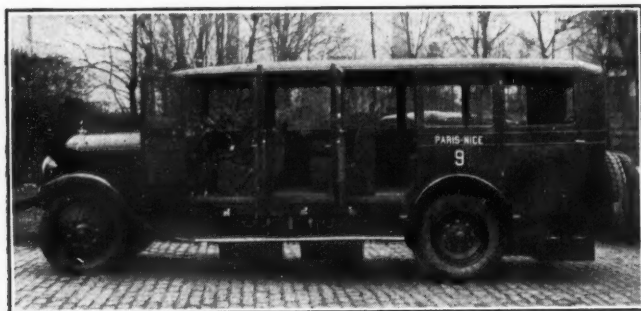
The bodies will be built in Bugatti's own shops and will be close-coupled four-seaters without running boards, with wells for the passengers' feet, with two doors on the left hand side, with a collapsible top and with one spare wheel mounted on the right hand side. List price of the car in France is about \$6,400.

First deliveries of the half-million-franc 200 hp. straight-eight Bugatti are expected to be made toward the middle of this year. A first batch of 25 is now going through and will be followed immediately by a second batch. This is the biggest and most expensive private passenger automobile in the world.

As a contrast to this big car, Bugatti intends to build 1000 diminutive automobiles, exact scale models of his 91½ in. racing cars. One car has been built for his own four-year-old son and has attracted so much attention that it has been decided to go into production on them. Having a 12-volt battery under the hood and an electric motor on the rear axle, the novelty of this automobile is that it is a true copy in every respect of the racing car.

French Bus Competes With Passenger Cars

DOMINIQUE LAMBERJACK, a well-known Paris dealer, sprang a surprise on the organizers of the annual Paris-Nice reliability sealed bonnet competition by entering a Saurer coach carrying a 12-passenger



Saurer 12-passenger bus with Weymann body

Weymann body. This competition is intended for high-grade passenger cars and in entering a 12-passenger coach Lamberjack set out to prove that he could provide greater comfort and equal speed at considerably lower cost than any of the normal private cars.

The Saurer, which is a new type overhead-valve, ball bearing engine with single reduction rear axle, has a speed range of 3 to 60 m.p.h. on high. It is equipped with four-wheel brakes and pneumatic tires. The body has been built specially by Weymann and is a 12-passenger eight-door saloon, with ample provision for baggage. A wireless receiving set, operating when under way, is installed.

Gasoline and oil costs for the 600-mile trip to Nice will be inside \$20, or approximately \$1.66 for each of the 12 persons carried. The cost for a motorcycle and sidecar would be more than \$2 per passenger; on a normal four-passenger car, the cost would be \$4; while by train, without a sleeper, the fare is \$20.

Several American cars are taking part in the Paris to Nice competition, including Buick, Chrysler, Elcar and Oakland.

New Graham Bodies Convertible

CONVERTIBILITY of body types is a feature of the redesigned ¾-ton commercial cars recently introduced by Graham Brothers, the truck and bus division of Dodge Brothers, Inc. This model is offered in four body styles, panel, canopy, screen and express, body parts for all four bodies having been standardized as far as possible to simplify production.

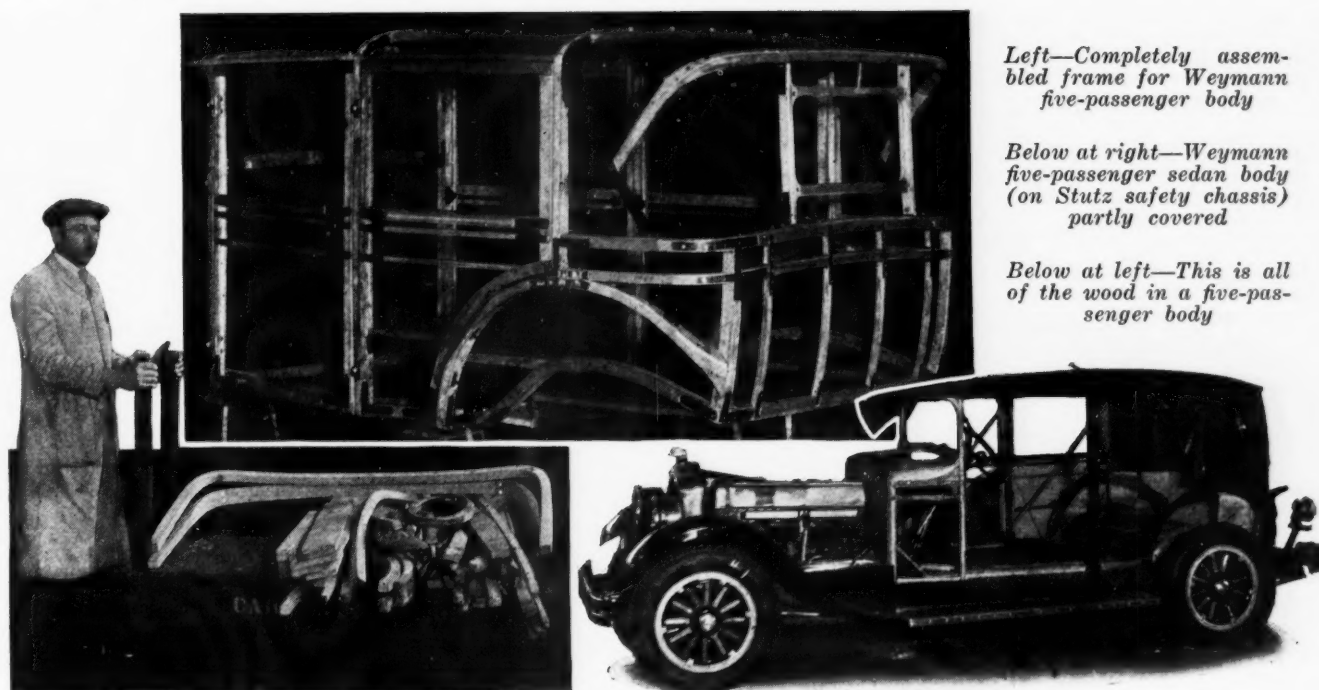
Built integral with the body, the cab is fitted with all-steel doors with drop windows operated by crank type regulators. Individual cab seats have folding lazybacks to permit passage into the load compartment. Panels on all types are sheet metal over wood, padding being inserted between the two for the purpose of eliminating rumble. Full length roofs are provided on all models except the express type.

In the panel delivery, the upper panels are of the same construction as used in the lower panels, adjoining edges being coated in assembly with a plastic material to prevent dust and water penetration. As mentioned, bodies are completely convertible, those portions not common to all types being shipped to dealers as special assemblies so that they may convert one type to another when necessary, following Graham Brothers practice with their 1 to 2-ton models. Convertible bodies permit the carrying of smaller stocks by dealers. In addition, where an owner desires to change a body style the conversion can be made by the dealer at a reasonable cost without scrapping the existing body.

Gramm "Fast Express" Truck

A NEW Gramm truck model, the "Fast Express," a companion to the Gramm "Fast Freighter," which went into production in January, is announced by B. A. Gramm, president and treasurer of Gramm Motors, Inc.

The Fast Express is a 2½-ton chassis mounted on 32 x 6 pneumatic tires (dual rears) and rated at 45 m.p.h. It is powered by an 80 hp. six-cylinder engine, is equipped with four forward speed transmission and has an oversize full floating rear axle. The radiator is unusually large and the hood design is new.



Left—Completely assembled frame for Weymann five-passenger body

Below at right—Weymann five-passenger sedan body (on Stutz safety chassis) partly covered

Below at left—This is all of the wood in a five-passenger body

Lines of Weymann Bodies Rounded With Curled Hair Padding

Harsh effect which was characteristic of first of this type of fabric leather coachwork in France eliminated by process used in company's American plant.

REGULAR production on a small scale is now under way at the plant of the Weymann American Body Co., the old National automobile plant, in Indianapolis. In accordance with the customary practice in France, where motorists usually purchase a chassis from the maker and then have it shipped to the "carossier" to have a body fitted, Weymann bodies are built directly on the chassis. At the present time practically all of the cars going through the plant are of Stutz make, the American venture having been started partly as a result of an offer of F. E. Moskovics, president of the Stutz Motor Car Co., to have a certain proportion of his production fitted with these bodies if they could be obtained in this country.

The Weymann is a fabric leather body with a very light wooden framework, and offers advantages based upon the reduction in car weight made possible by it, and upon the elimination of body squeaks which its construction assures.

In the case of a 5-passenger sedan body substantially 600 lb. can be eliminated. One car of well-known make, which when fitted with the conventional composite sedan body weighs 4400 lb., shows a direct saving on body weight of 538 lb. In addition, in order to insure the same spring action with the lighter body, 48 lb. are

taken out of the chassis springs, making the total saving 586 lb. When it is considered that a lighter frame could be used to carry this lighter body, especially in view of the fact that the body construction is such that no body squeaks and no abnormal body strains can result from chassis weave, and that this reduction in the weights of the body and the frame would warrant the use of a lighter powerplant, it is plain that the above figures hardly represent the full weight-saving possibilities of this type of body.

Center of Gravity Lowered

In this connection it is apropos to point out that, with the exception of the spring weight, all of the weight eliminated is located above the chassis frame. As a result, the center of gravity of the complete car is materially lowered, there is less rolling and swaying of the body, and the stability of the car is increased, which latter features, no doubt, appealed particularly to the Stutz president.

The Weymann body has a framework composed of a number of "parallelograms" consisting of wooden bars joined by stamped or sawed-out steel angles and plates. These bars, which are made of ash, are 1½ in. wide by 1¼ in. thick, and wherever possible they are joined by

two drilled and countersunk steel plates or angles. It is the design of these joints between frame members that makes the Weymann body free from squeaks. In the first place, the wooden members of the parallelograms do not come in contact with each other, but are separated by a space of about $\frac{1}{8}$ in. Then, oiled paper or some other anti-squeak material is placed under the steel joint members. These members are made of $\frac{1}{8}$ in. steel and are held in place by countersunk machine screws and nuts, the ends of the screws being riveted over after the nuts have been set. It is planned to replace the screws by rivets in the future.

Frame Bolted to Chassis

The frame of the body is secured to the chassis frame by means of $\frac{5}{16}$ in. bolts which pass through the lower horizontal members of the parallelograms and the flanges of the frame side bars. Floor boards are independent of the body, as are the seats, both of these latter parts being separately secured to the chassis frame.

The entire frame structure normally consists of three parallelograms, located, respectively, at the forward end, back of the front door and back of the rear door; in case a rear quarter window is wanted a fourth parallelogram is added. Then there are the door frames, two for each side in the case of the standard sedan. The rear seat portion of the frame is built up separately, as shown in the view of the assembled body frame.

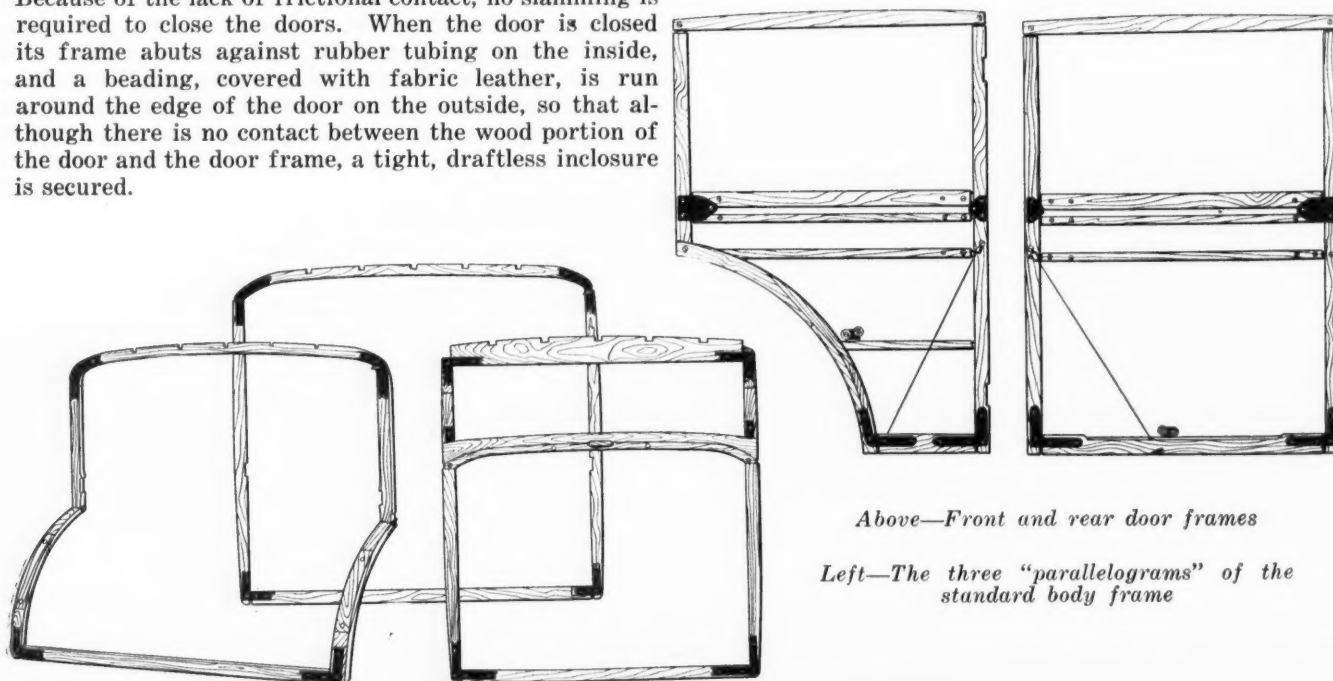
In connection with the door frames, provision must be made for the windows and window regulators. In order to provide against the possibility of some one "hanging his weight" on the door and distorting the parallelogram of its frame, a diagonal stay of aircraft wire is used, secured to the forward vertical and the bottom frame members by suitable fittings. When the door is closed the wire is not in tension, but it becomes taut under the weight of the door when opened and takes up practically all additional load that may be put on.

A good idea of the lightness of the whole construction is obtained by opening and closing the doors. The difference in the "feel" of these doors and of conventional closed body doors is about the same as the difference between screen doors and ordinary house doors. Because of the lack of frictional contact, no slamming is required to close the doors. When the door is closed its frame abuts against rubber tubing on the inside, and a beading, covered with fabric leather, is run around the edge of the door on the outside, so that although there is no contact between the wood portion of the door and the door frame, a tight, draftless inclosure is secured.

The first Weymann bodies built in France had rather severe lines, and it was assumed at that time that this was an inherent characteristic of this type of body construction. This, however, is incorrect. The Stutz with Weymann sedan body has the same attractive lines as the better bodies of the more conventional types. When fabric or artificial leather is stretched over a frame panel it naturally tends to give a flat surface, but a rounded effect can be obtained by means of curled hair padding. At the cowl the desired form is obtained by using a formed sheet of aluminum under the artificial leather. In the photograph of the assembled body frame it will be seen that the upper horizontal members of the parallelograms have cut-outs for the roof slats. After these slats are in place the frame is covered with a heavy (12-14 oz.) duck, which is tacked to the frame members. Over this is placed the curled hair padding, which is held in place by cotton sheathing not unlike cheese cloth but more closely woven. Then the whole is covered with Zapon artificial leather, a material with a basket weave fabric base and a nitrocellulose finish which can be had in any shade. The general appearance of the body is improved by the use of beading, which may be finished in the same color as the panels themselves or in a different shade. On the Stutz the engine hood also is covered with the artificial leather, which is cemented to the metal by means of an adhesive preparation with a rubber base.

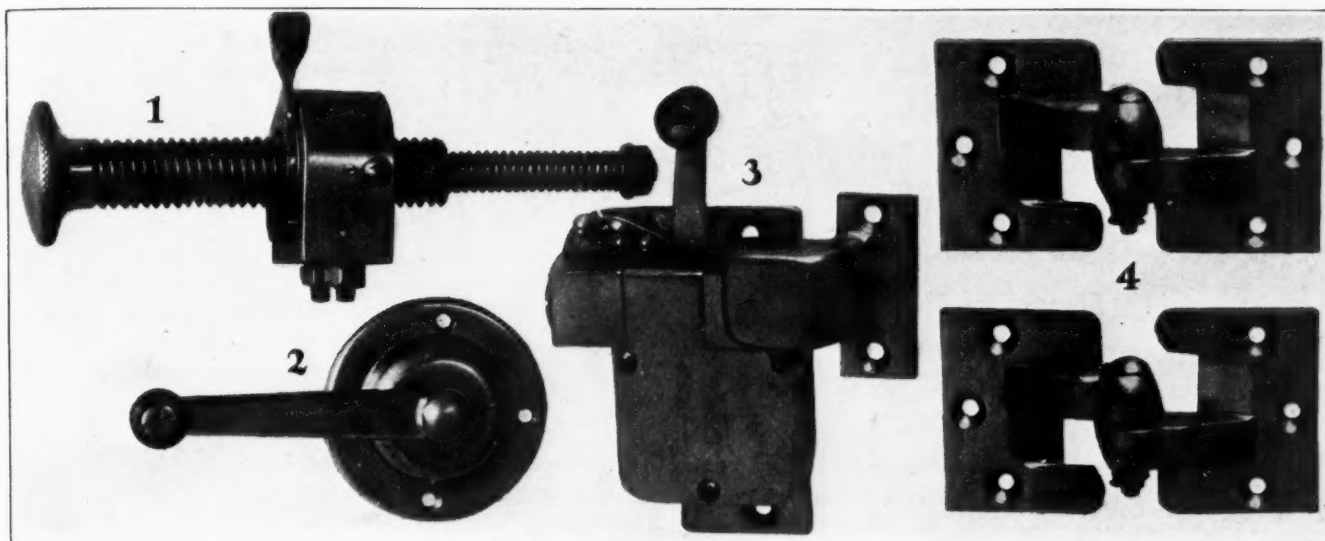
Fenders Supported by Body

One of the problems in the design of bodies of this type consists in making provisions for suitable joints between parts of the flexible body and parts of the more rigid chassis. For instance, the sheet aluminum support for the artificial leather covering of the cowl is fixed to the body frame only at the rear, while it rests loosely on the dashboard in front. The fenders, contrary to conventional practice, are supported by the body, and as the running boards are secured to the frame side members, it is impractical to fasten the fenders to the running boards, as is usually done. Instead, a piece of sponge rubber is fastened to the end of the running board and the fender is allowed to rub against this.



Above—Front and rear door frames

Left—The three "parallelograms" of the standard body frame



1. Windshield adjusting mechanism. 2. Window-regulating crank-handle. 3. Door lock. 4. Hinges

The windshield also is protected against injury due to frame distortion by sponge rubber strips.

In the Weymann body the seats are separate parts. They comprise a wooden base or frame supporting a very deep spring cushion, over which there is a padding of curled hair. In the case of the rear seat the back is made rigid with respect to the base, while the back of the front seat is hinged near the base and held in a definite relation to it by means of adjustable straps at the sides, so that the inclination of the back can be varied to suit different drivers. The interior of the body is trimmed the same as any other type.

All of the body hardware is at present being imported from France and differs greatly from the conventional designs used with other types of construction. The doors being very light, the hinges used for them are correspondingly light and made of manganese bronze castings. They have Zapon hinge pins and are described as of the floating type. These hinges, together with the lock, are designed to form a flexible three-point support for the door when closed. The door frame does not contact with the body frame members at any point when closed, being assembled with spacers between it and the body frame. The lock is of such design that a sort of universal joint effect is obtained, which prevents overstraining of any part due to frame weave.

Rubber Runs for Windows

Window glasses move in rubber runs and are raised and lowered by means of a crank handle operating through a silk cord and pulley mechanism. Sufficient freedom is allowed the glass in the run so that any ordinary flexing of the doors will not break it. The glass is supported slightly off center so that it normally rests against the rear run, and although it has a certain free motion in the fore and aft direction in case of sudden deceleration, this occasions no rattle, by reason of the rubber cushion of the runs.

An unusual design of one-piece windshield is used with these bodies. The glass is mounted in metal channels forming a frame that is hinged to the body front "parallelogram" at the top. It is opened and closed by means of a mechanism of which a photograph is reproduced herewith. This comprises a compound screw, the inner screw having a left-hand and the outer a right hand thread. The outer screw is provided with a nut

having a ball and socket support in a bracket secured to the cowl board, while the inner screw has a flexible connection with the windshield frame. The two screws being threaded oppositely, a faster opening and closing motion is obtained when turning the knob on the outer screw. A brake on the outer screw serves to lock the adjustment.

Panels Easily Replaced

In conclusion, a word in regard to the relative immunity of the fabric body from injury may not be amiss. There is no possibility of denting and unless the body panel is struck by some sharp object with sufficient force to puncture the fabric leather, no injury results, as a rule, and it is said that the covering material used is about as hard to puncture as the thin, soft steel usually used for bodies. In case of injury to a panel repairs can be made in any trim shop, and no repainting is required.

Owing to the fact that the bodies must be built on the chassis—although it is hoped to overcome this limitation in time by the use of assembly frames—it is planned to license car manufacturers who wish to adopt this type of body to build them in their own plants, and in the course of time the Indianapolis plant probably will be confined to custom work and to the training of mechanics for the plants of licensees.



Interior of a Weymann fabric leather body

Automobile Thefts Still Increasing But at Slower Rate

Improved locking devices, identification plates, certificate of title laws and better police methods are bearing fruit. Great majority of cars now recovered.

AUTOMOBILE thefts in the United States are still increasing but during the last several years a gradual decline in the rate of increase has taken place.

In 28 index cities for which the records are tabulated, 95,225 cars were stolen in 1926, according to the National Automobile Dealers' Association. Thefts in the same cities during 1925 totaled 77,174. The numerical increase in 1926 therefore was 18,051. But the percentage increase was only 23.31, whereas the increase of 1925 over 1924 was at the rate of 34.61 per cent, and in 1924 the thefts were 44.47 per cent greater than in 1923.

Also there has been a marked decrease in the percentage of stolen cars permanently lost to the owners.

Police More Proficient

Each year the police officials and insurance companies are becoming more proficient in their methods of tracing and recovering stolen cars, with the result that it is now extremely difficult for the thief or the persons with whom he deals to keep possession of the loot for any length of time.

The records show that 89 per cent of the cars stolen in 1926 were eventually recovered. Only 11 per cent disappeared entirely. This compares with 14 per cent never recovered in 1925; 17 per cent in 1924; 18 per cent in 1923; 23 per cent in 1922, and up to 29 per cent in 1921 and 1920.

Two factors which are aiding materially at present in the recovery of stolen cars are state certificate of title laws and the tamper-proof identification plates which are coming into use on a number of makes of vehicles. These not only make it more difficult for the thief to dispose of the stolen property, but they also act as deterrents which no doubt account in part for the lower rate of increase in car thefts, as discussed above.

Locks of various kinds, which have come into general use in recent years, have also been of material aid in checkmating the activities of the thief, and particularly the coincidental lock, which is designed to protect the motorist in spite of himself. Such locks are now standard equipment on probably close to 50 per cent of passenger car production.

Further Improvement Certain

All of these things—improved locking devices; certificate of title laws; infallible means of identification; increased effectiveness of police methods—will have their influence on future car theft statistics and it is reasonable to assume that the result will be a gradual improvement.

New York has led all the other cities in the country

in the number of cars stolen for many years, but Detroit stepped into first place last year with 14,820 cars stolen and 13,009 recovered. New York had 12,099 cars stolen and 9726 recovered. Chicago moved into second place, also outdistancing New York, with 12,525 cars stolen and 9616 recovered.

High-class police work was evidenced in the Detroit handling of motors thefts. Recoveries in Detroit averaged around 88 per cent of cars stolen while in New York and Chicago less than 75 per cent of the cars stolen were regained by their owners.

Disposition of law officers to treat automobile thieves as minor rebels against social customs rather than vicious violators of the criminal code is largely responsible for the steadily rising toll of automobile thefts, in the opinion of C. A. Vane, general manager of the National Automobile Dealers' Association.

"Prosecuting attorneys and trial judges are putting too much of a handicap upon police officers by their misguided lenity toward automobile thieves," Vane declares. "The thief no longer fears to steal an automobile because he feels certain that the majority of prosecutors and judges regard automobile thievery as just a conventional crime. Laxity of enforcement of automobile theft penalties, however, is fraught with the gravest consequences, because it is in stolen automobiles that the greater majority of bank burglaries, store and residence hold-ups, and, in many cases, fatal knock-downs of pedestrians on the highway, are consummated.

The School of Banditry

"Many a gang of criminals that today is operating as a highly organized and effective robber band is a collection of young men who started their criminal careers in a 'temporarily borrowed automobile.' It was so easy that the borrowed property was never returned. The thief then found himself in an environment where money to support his desires was far beyond his capacity to obtain honorably and he turned to burglary and robbery as the easiest way of keeping himself in funds. Police chiefs, and particularly the men on the detective squads, carry on their work today in the larger cities as a routine, largely without zest, so far as automobile thieves are concerned because of the mild punishment meted out to motor thieves by courts and prosecutors. There is little inspiration for a peace officer to put in the arduous effort required and court the danger present in breaking up an automobile theft ring when previous experience has taught him that within a month after arrest the criminals will be at liberty again after paying a misdemeanor fine or be on parole obtained through political influence.

"Certificate of title laws and the general exchange of information between the 48 state commissioners of motor vehicles has made the disposal of stolen cars less lucrative as an occupation than it formerly was, but law enforcement by the courts is needed to reduce the thefts, particularly where the stealing is done with the intention of keeping the car for the thief's own personal use."

The detailed figures covering the 28 cities in 1925 and 1926 and the complete figures showing all thefts, recoveries and non-recoveries in the 28 cities over a nine-year period have just been made public by the N.A.D.A. and afford an interesting study of the situation in different sections of the country. It will be seen by referring to the figures, published herewith, that the

stealing of motor vehicles has assumed the proportions of a small industry. Based on city registrations as published in the National Automobile Chamber of Commerce *Facts and Figures*, one out of every 24 motor vehicles owned in Detroit in 1925 was stolen. The turnover in stolen cars there during the year represented 4.22 per cent of the total registration. One out of every 45 cars in Chicago was stolen; one out of every 44 in Cleveland, and one out of every 43 in New York City.

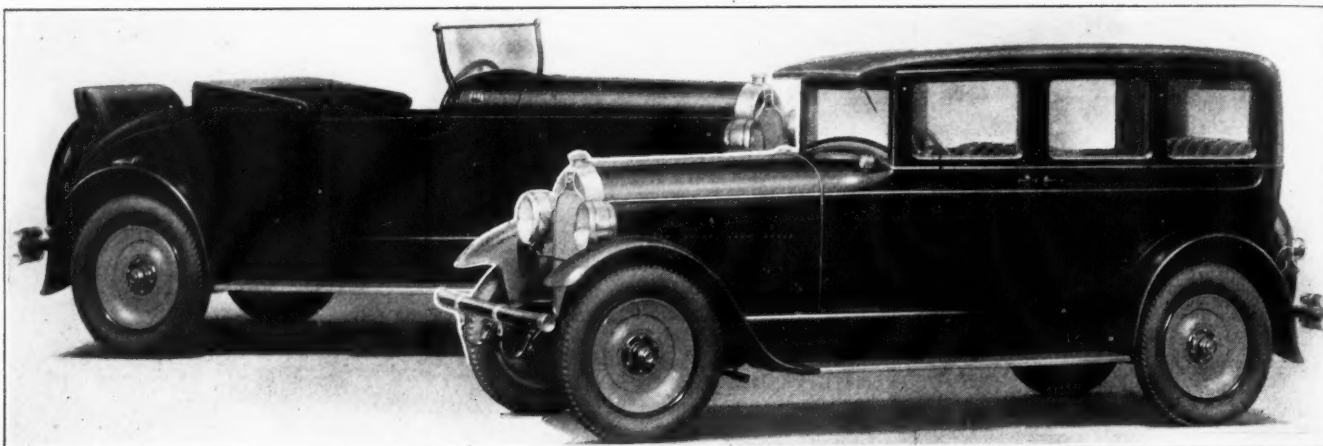
The cars stolen in New York City in 1925 represented 2.32 per cent of the total number registered; in Chicago 2.2 per cent, and in Cleveland 2.29 per cent.

Why the theft percentage in Detroit should run so far ahead of that in other cities is not explained in the N.A.D.A. summary.

Automobile Theft Record, 28 Index Cities— 1925-1926

	STOLEN		RECOVERED	
	1925	1926	1925	1926
New York	11,895	12,099	8,659	9,726
Chicago	7,587	12,525	5,953	9,616
Detroit	11,750	14,820	9,959	13,009
Cleveland	3,748	4,736	3,252	4,214
Los Angeles	8,392	10,505	7,313	10,271
Kansas City	1,638	2,838	1,389	2,493
Portland	1,223	1,445	1,177	1,427
Denver	1,036	1,171	1,003	1,148
San Francisco	3,746	4,740	3,689	4,692
St. Louis	3,436	4,187	3,416	4,264
Seattle	2,064	2,433	1,881	2,264
Indianapolis	2,472	3,601	2,074	3,304
Boston	5,490	4,764	4,881	4,304
Salt Lake City	1,053	956	1,023	938
Oakland, Calif.	2,019	2,006	1,948	2,038
Omaha	715	904	840	887
Columbus, Ohio	1,137	1,604	1,109	1,546
Cincinnati	2,641	3,440	2,401	3,214
Oklahoma City	389	698	311	584
Albany	404	414	205	270
Buffalo	1,904	2,567	1,750	2,369
Newport, R. I.	32	34	32	34
York, Pa.	48	76	50	75
Grand Rapids	792	699	754	667
Richmond, Va.	478	629	419	563
Dayton, Ohio	485	663	464	584
Lowell, Mass.	74	81	64	74
Evansville, Ind.	526	590	479	539

	STOLEN	RECOVERED	NOT RECOVERED
1918	27,445	21,673	5,772; 21% of No. stolen
1919	33,508	24,740	8,768; 26% of No. stolen
1920	30,046	21,273	8,778; 29% of No. stolen
1921	37,554	26,517	11,037; 29% of No. stolen
1922	35,334	27,240	8,094; 23% of No. stolen
1923	39,612	32,384	7,228; 18% of No. stolen
1924	57,331	47,484	9,847; 17% of No. stolen
1925	77,174	66,420	10,754; 14% of No. stolen
1926	95,225	85,114	10,111; 11% of No. stolen



Left—Davis Series 98 Polo roadster. Right—The Emperor sedan

Davis Enters 8-Cylinder Field With Sedan at \$1,885

*Line also includes coupe at \$1,865 and roadster at \$1,795.
Engine is Continental with 246.6 cu. in. displacement.*

WITH the announcement of its new Series 98, equipped with a Continental engine, the George W. Davis Motor Car Co., of Richmond, Ind., enters the ranks of manufacturers of eight-cylinder cars. The new car has a wheelbase of 118 in., while the engine has a displacement of 246.6 cu. in. and develops in excess of 70 hp. Three body types will be furnished on this chassis, known respectively as the Emperor sedan, the Princess coupe, and the Polo roadster. The price of the sedan is \$1,885; that of the coupe, \$1,865, and that of the roadster \$1,795. A touring car will be made also, but for export only.

The Continental engine has a bore of $2\frac{7}{8}$ and a stroke of $4\frac{3}{4}$ in. Its crankshaft, which is machined all over, is supported in five main bearings of $2\frac{5}{8}$ in. diameter. A full-pressure lubricating system is used and a Lanchester vibration damper is fitted to the forward end of the crankshaft.

Fuel is fed by the Stewart vacuum system from a large rear-mounted tank to a Stromberg carburetor fitted with an AC air cleaner. The electrical system is of Delco-Remy make and comprises three units, generator, starter and interrupter-distributor. A Bendix drive is used in connection with the starter. The radiator is of the cellular type and is nickel-plated.

Transmission Assembly

Power from the engine is transmitted to the rear axle through a Borg & Beck clutch, a Warner Gear Co. three-speed and reverse transmission, and a straight-line drive comprising the Cleveland propeller shaft and universal joints. The transmission is fitted with the Johnson transmission lock. The front axle is of the I-section and the rear axle of the three-quarter floating type. Timken roller bearings are used throughout.

Four-wheel brakes of the Lockheed hydraulic type are standard equipment, and are supplemented by an emergency brake on the transmission. The frame has side bars with a channel section 6 in. deep and is provided with heavy cross members. It is supported by chassis springs of silico-manganese steel, provided with spring bolts $\frac{3}{4}$ in. in diameter, passing through bronze-bushed spring eyes. Five Distell disk wheels come with each car, and the tire equipment is Goodrich full balloon, 32 x 6 in. The steering gear is of the Ross cam and lever type and headlight control is from the wheel. Chassis lubrication is by the Alemite oil system.

Bodies of Composite Construction

All bodies are of composite construction, with sheet metal paneling over a wood frame. Windshields are of the VV type and can be adjusted by means of a crank lift. All of the instruments on the dashboard are mounted under one glass. All lamps have shells of solid brass, nickel-plated. In addition to the head lamps, which are provided with twin-beam, double-filament bulbs, cowl lights are provided.

The Emperor sedan has button-tufted silk mohair upholstery with very deep bats. In the rear compartment, two foot hassocks take the place of the ordinary foot rail. Other equipment in this compartment includes a lounge pillow, smoking and vanity cases, and toggle grips. All interior hardware is of Butler silver finish. The doors are finished with burrowed walnut panels.

The coupe is finished in the same general style as the sedan, but, of course, does not carry the rear compartment equipment. This model comes with an auxiliary seat for two in the rear and with a golf door (for golf sticks) in the side. The rear window can be raised so that the passengers occupying the rear seat can con-

verse with those inside the car. An exceptionally wide seat is a feature of the roadster. It accommodates three persons comfortably, and as there is also room for two in the rear, this is a five-passenger model.

Standard equipment on all models includes the following items: Stewart-Warner speedometer, oil gage, radiometer, ammeter and gasoline gage assembled under one glass in the instrument board, with indirect illumination; Klaxon magnetic horn, stop light, automatic windshield cleaner, rear vision mirror, jack and full set of tools. The Emperor sedan has, in addition, two foot hassocks, a lounge pillow, smoking and vanity cases,

corded silk hand grips and an interior heater, satin finish interior hardware, door locks and dome light. Ballcrank or C. G. nicked spring bumpers for front and rear are extra.

A feature of these new eight-cylinder models is their low weight. Completely equipped with bumpers, etc., the weight of the sedan is only 3300 lb., while the coupe weighs 100 lb. and the roadster 200 lb. less. On both the coupe and the roadster Dupont's teal brown roof covering is used. This is a new covering material which is guaranteed not to fade. The springs are fitted with Hexdees.

Tractor Design Analyzed by German Engineer

AN analytical article on "Industrial and Agricultural Tractors" by Prof. Dr.-Eng. G. Becker of Charlottenburg, which apparently is based chiefly on the test results of the Nebraska State University Engineering Department, has been published in *Motorwagen* and forms a section of a book on the same subject published by M. Krayn, Berlin. Maximum drawbar pull in the field on the different gears is plotted against the weight of the tractor without operator, and it is shown that, on the whole, the traction efficiency of both wheeled and creeper tractors decreases as their size or weight increases.

High Traction Efficiency

A few of the creeper tractors have a traction efficiency of practically 100 per cent; that is, they are capable of exerting a drawbar pull in low gear equal to their weight. The Cletrac tractor, for instance, with a weight of 4620 lb., develops a drawbar pull of 4370 lb., which Dr. Becker ascribes to the favorable layout of the creeper track and the location of the center of gravity. When fitted with rubber tires for road work the maximum drawbar pull of wheeled tractors appears to be about 50 per cent of their weight.

Dr. Becker makes use of a diagram showing the increase in the ground pressure of the rear wheels and the decrease in the ground pressure of the front wheels with the drawbar pull, both graphs being straight lines. On the basis of these graphs he reaches the conclusions that it is wrong to design a tractor with front drive and that a four-wheel drive tractor has little advantage over one with rear wheel drive if the weight of the latter is correctly distributed.

An engine performance chart is given in which the speed in r.p.m. is plotted along the horizontal and the horsepower per liter (61 cu. in.) on the vertical axis. It is shown that the great majority of engines develop 1 horsepower per 1000 r.p.m. per 10 to 15 cu. in. displacement, only a relatively small number of points lying outside the two inclined straight lines representing these specific outputs.

Stress on Gear Teeth

The stress in the teeth of the transmission gears also has been calculated for a considerable number of tractors, in which calculation, however, the tooth number or Lewis factor seems to have been disregarded and it is stated that the transmissions which in the analysis showed the highest tooth stresses gave the least satisfactory results in trials.

Prof. Becker draws the following conclusions from the results of his analysis: Recognition of the peculiarities,

advantages and disadvantages excludes the possibility of creating a single tractor type for the multifarious applications in agriculture and industry and the various working conditions.

Wheeled tractors have the advantage of a more diversified applicability in the field and on the road. They also give the greatest latitude for the utilization of the output factor "working speed." If in the further development of motorization the working speeds should be driven up, working conditions will change in favor of the wheeled tractor.

The deficiencies of many wheeled tractors referred to (wheels too small for field work, poor utilization of the total weight as adherence weight for the driving wheels, too low working speeds, designs which are wrong in principle, such as front wheel drive, and high pressures in the transmissions due to unfavorable transmission design and an unsuitable type of engine) can be eliminated as a result of the knowledge gained.

The question of the best type of engine is dependent in the first place upon the working speed and only in the second place upon the economy of the engine.

Creeper Type Has Advantage

The creeper type of tractor, properly designed in accordance with the principles laid down, has the advantage in field work and on ground of low carrying capacity, that it is capable of developing greater drawbar pull and utilizes the engine power more efficiently. For road work and for higher working speeds the creeper type tractor is less suited.

The attempts to combine wheeled and creeper tractors in one design are justified in principle by the experimental data of efficiency and economy. Simple operation and rational production must be kept in view, however.

The whole problem of motorization is dependent upon the working speed. Most of the work in the field and also a good deal of road work is still being accomplished at speeds corresponding to those obtained with animal traction. One reason for this is that, to start with, it was necessary to use the implements already available, but this is undoubtedly a great handicap to motorization. An increase in working speed makes the whole system more efficient and more economical and will give a new aspect to motorized agriculture.

To further this development it is necessary to investigate the possibility of increasing the working speeds of agricultural implements. As far as vehicles are concerned, motor vehicle practice already yields sufficient data which should be drawn upon to an increased extent in the development of new designs.

Trends in Motor Truck Design Are Toward—

1. Higher Operating Speeds
2. Four-Wheel Brakes
3. Six-Wheel Chassis
4. Larger Factors of Safety
5. More Transmission Speeds
6. Oil and Air Cleaners
7. Four-Wheel Drive
8. Pneumatic Tires
9. Six-Cylinder Engines

Commercial car engineers discuss the new developments in their field at March meeting of Metropolitan S. A. E. Several recent truck models are described.

By Donald Blanchard

PRESENT and future developments in motor truck engineering were viewed from all angles at the March meeting of the Metropolitan (New York City) Section of the Society of Automotive Engineers. The program was patterned after the January "What's New at the Show" meetings which have been so successful.

Among the companies represented in the all-star aggregation of speakers were American-La France, Autocar, Four Wheel Drive, International Harvester, Mack, Pierce-Arrow, Reo and White. The talks were summarized by A. W. S. Herrington, consulting engineer of Washington, D. C.

T. C. Smith, American Telephone & Telegraph Co., was chairman of the meeting.

Among the outstanding topics discussed might be mentioned higher operating speeds, four-wheel brakes, six-wheel chassis, larger factors of safety, more transmission speeds, six-cylinder engines, air cleaners, oil cleaners, four-wheel drive and pneumatic tires.

The rational development of long-distance hauling led to the design of the new Autocar speed truck, according to B. B. Bachman, chief engineer at that factory. In the service for which this job was designed, the maneuverability obtained by placing the engine under the driver's seat is not essential and consequently the powerplant was put in the conventional position. The aim in this model was to provide a truck that could maintain its position in the traffic stream with passenger cars through quick acceleration and four-wheel brakes.

Heavy trucks must go where loads are and deliver material where it is needed without regard to road conditions. These considerations make desirable a greater range of performance which can be provided by driving all four wheels. The increased traction obtained with this type of drive was one of the means mentioned by E. R. Greer, Four Wheel Drive Auto Co., by which a greater performance range can be obtained. Other

means listed by him were the use of the highest grade materials combined with careful workmanship, greater engine power, additional transmission speeds and better control, especially in the matter of brakes. F.W.D. is using a five-speed transmission with single lever control.

In his summary, Mr. Herrington pointed out that the necessity of using up surplus war stocks of four-wheel drive trucks had held back development in this field but that these were approaching the replacement stage and that more rapid development of the four-wheel drive might be expected.

Use of Heat-Treated Steels

The outstanding developments in truck engineering mentioned by S. W. Mills, Pierce-Arrow Motor Car Co., were the use of larger factors of safety, engine refinements, more powerful brakes, higher road speeds and pneumatic tires. Larger factors of safety are essential under present heavy loads and higher road speeds and heat-treated steels are being used more frequently for this reason. The tendency toward deeper frames is another evidence of development in this direction, one company using 10 in. deep frame side members. Mr. Mills expects no immediate departure from conventional transmission design although there may be some modifications to secure easier shifting, satisfactory devices for this purpose now being available. In lighter trucks, he expects the over-gear to become increasingly popular. Mr. Mills also looks for the more general use on all sizes of trucks of oil cleaners, pneumatic tires and electric starters.

The demand for high speed transportation of heavy loads led to the development of the American-La France five-ton, pneumatic-tired job with a top speed of 35 m.p.h., according to W. G. Hawley, chief engineer of that company. It was believed that the higher initial cost of the vehicle would be justified economically by the higher speeds and rough comparisons of cost figures indicate the correctness of this belief. One of the un-

usual features of this design is that the steering wheel is mounted on an A-frame. One member of this frame lies in the prolonged axis of the steering wheel and carries the spark and throttle controls while the other extends down through the floor boards at a smaller angle to the vertical and constitutes the steering column proper. An inclosed pair of bevel gears directly under the steering wheel provides the connection to this column. The advantage of this construction is that it places the steering wheel at a comfortable angle and yet it makes it possible to put the steering gear under the floor boards instead of in the engine compartment, thus making the powerplant more accessible. At the same time, the connection of spark and throttle controls is simplified.

The Commercial Aspects

The commercial aspects of truck engineering were emphasized by E. A. Johnston, International Harvester. He said that the engineer must concern himself with manufacture, sales, operation and service. Much could be saved if standardized ratings were adopted and lack of them was frequently responsible for unsatisfactory operation and indirectly for adverse legislation limiting gross weight. Such limitations have produced a tendency to use overloaded chassis of lighter weight. Among the engineering problems mentioned by Mr. Johnston which affect salability of the truck were appearance, quietness of operation, freedom from excessive vibration, driver comfort and ease of operation.

"The extended profitable operation of trucks," Mr. Johnston said, "will depend largely upon how successful we are in the development of trucks and trailers which will handle a sufficient tonnage at a speed which will keep the cost per ton-mile down to the minimum without excessive destruction of the roads which may result in a prohibitive tax burden and the enactment of laws limiting weight and speed of the loaded vehicle to a point where the cost per ton-mile will be excessive and not competitive with other forms of hauling. This situation may be met by reducing the weight of the chassis, especially unsprung weight, by increased road speeds, pneumatic tires, trailers and semi-trailers, and the six-wheeler."

A brief description of the new Mack six-wheel truck was presented by Charles Froesch, representing A. F. Masury of the Mack company, who could not be present. This model is a modification of the Mack Bull-Dog with two rear axles spaced 46 in. apart. Only the forward axle is driven, power being transmitted to it through chains. The springing consists of two inverted semi-elliptics on each side, one above and the other below the rear axles. The lower spring is anchored at its center to a trunnion on the frame while the upper spring has a rubber mounting at its center. The front ends of the springs are 3 in. shorter than the rear which places 42 per cent of the load on the forward rear axle, 33 per cent on the rear axle and 25 per cent on the front axle. This gives the same load on the driving wheels as on the standard four-wheel truck. Service brakes act on the driveshaft through a booster while there are two hand brake levers, one operating a set of brakes on the forward rear axle and the other a set on the rear axle. Two wheelbases are available, 128 and 190 in., measured from the front axle to the forward rear axle. The shorter length is for dump truck service.

Mr. Froesch also mentioned that the gas-electric drive was available in the Model AB chassis and described briefly the Model AP fire pumper.

The increasing use of six-cylinder engines in the truck field was brought out by C. F. Magoffin of Reo. In

1924, trucks produced by his company all had four-cylinder engines while in 1926 only 20 per cent had this type, the balance being sixes. He said that operators preferred the six even though it cost more and that repair costs per 1000 miles were less on the six than on the four. Because of their greater strength, long addendum gears are now used in the differentials of all Reo trucks. Mr. Magoffin also showed a view of a model with six-cylinder engine assembled in a unit powerplant, metal wheels, longer springs, heavier frame and magazine oiling system.

Recent improvements in the lubrication of White truck engines were described in some detail by G. W. Smith, representing H. D. Church of the White Co. In addition to the automatic blow-off valve which is progressively metered for variations in viscosity, the GRB and GRC engines have a fixed adjustable orifice located at the end of the main delivery passage. This adjustable valve varies the pressure with the engine speed and the surplus oil takes care of the front-end drive. The range of adjustment in combination with the capacity of the pump makes it possible to maintain pressure between major overhauls.

An oil reservoir containing the pump is cast integral with the crankcase. Oil enters it through a screen of large area from a sediment chamber in the bottom of the pan. This screen is horizontal and is self-cleaning.

The throw-off of oil to the cylinder walls and pistons has been regulated to take place during the portion of the stroke when it is most effective. The rod bearings have angular grooves extending for about 45 deg., thus limiting the throw-off to that period during which the groove matches with the hole in the crankpin. The quantity is accurately metered to each cylinder by a clearance groove broached longitudinally at the joint between the rod and cap.

The GRC engine used in the new Model 56 has rods drilled for positive piston pin lubrication. Machined combustion chambers and accurate balance of reciprocating and rotating parts contribute to its smoothness. Brakes on this model are of the two-shoe self-actuating type with floating camshaft. On the heavy-duty models, the service brake drums are now spline-mounted on the propeller shaft and kept tight by a special split-collet construction. These models also have an auxiliary transmission with a 1.58 to 1 reduction giving five speeds.

Herrington's Summary

In his summary, Mr. Herrington touched on a variety of points. He expressed the opinion that the trend was toward lighter, higher-speed trucks and with this type four-wheel brakes were most desirable.

In a test observed by him, six taxicabs equipped with air cleaners and six not so equipped were operated over the streets of Baltimore. At the conclusion of the test, the carbon in the engines not equipped with air cleaners contained 8 per cent of silica which Mr. Herrington interpreted as tending to disprove the claim that road dust was not important on improved highways.

Mr. Herrington also emphasized the importance of educating state authorities on the desirability of legislation favorable to the six-wheel vehicle. He also pointed out that the tendency to reduce gross weight limits would increase the number of trucks on the highways and thus add to present traffic congestion. As in the case of the four-wheel drive mentioned previously, Mr. Herrington stated production of heavy-duty trucks of conventional design also might be expected to show a relative increase, as the war surplus of trucks of this type would soon have to be replaced.

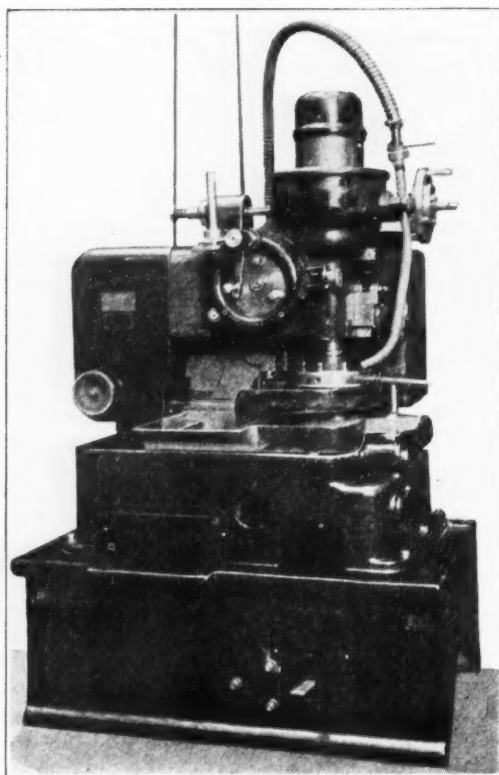


Fig. 1. Front view of high-speed gear shaper arranged for side-trimming direct-drive internal clutch gears

THE second speed sliding gear of an automobile transmission carries a member of the high speed clutch, which is made in several forms. In some cases half-round holes are drilled and reamed in the sliding clutch member, and the forward ends of the teeth of the direct-drive pinion are rounded to correspond. In other cases internal gear teeth are generated in the forward end of the sliding gear, and, to facilitate engagement, the external diameter of the teeth is reduced slightly on the direct-drive pinion.

The "half hole" form of clutch member, which is formed by drilling and reaming, has been used rather extensively where the sliding gear has a hub which extends beyond the face, or is flush with the face of the gear. This design prevents the use of an internal generating cutter for shaping the teeth.

Push-Broaching Methods

Another method is to rough-drill a series of holes in the face of the sliding clutch gear, and then form the internal teeth by means of push broaches. By this means a more accurate and interchangeable product is secured, but at an increased cost. The push-broaching operation cannot be completed with one broach; it requires a series of broaches, thus retarding production. The cost of the broaches also is an item, because the finishing broach must be kept up to size.

An improved method of machining clutch gears having hubs which are flush with or extend beyond the face has recently been devised by The Fellows Gear Shaper Co. This consists in the use of a "side-trimming" gear shaper cutter, which completes the teeth in the clutch after they have been roughed out by drilling. The machining is accomplished on the high-speed gear shaper, which is especially arranged for this purpose as shown in Fig. 1. On this machine the teeth are formed—not

Clutch Gears Machined in Side-Trimming Gear Shaper

Teeth completed on high-speed machine after they have been roughed out by drilling. Two minutes per gear is floor-to-floor time as operation of cutting takes only few seconds.

generated—the cutter being made a duplicate of the male clutch member, with the exception that the teeth are reduced in thickness and that the diameter of the cutter is made larger to provide for clearance. The axes of both cutter and work coincide, and in starting, the teeth of the cutter are centered in the spaces of the work.

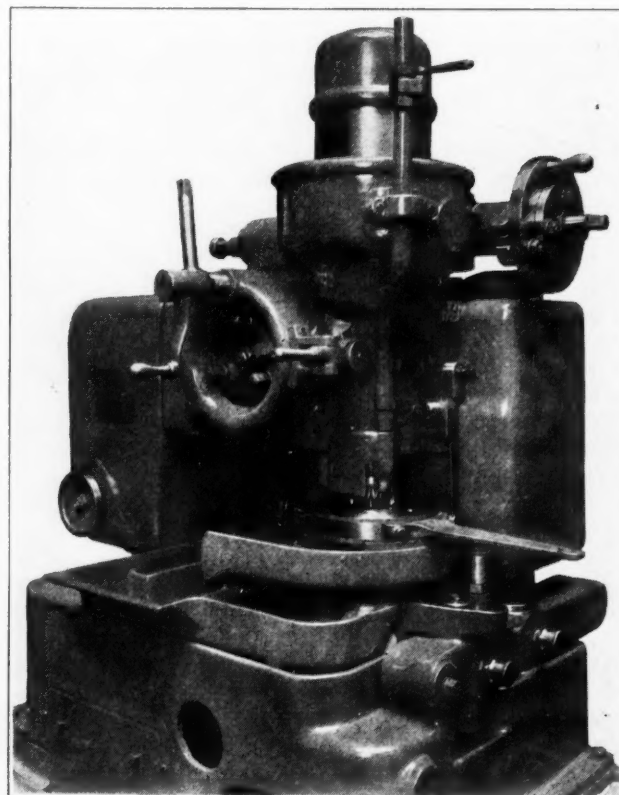


Fig. 2. Close view of side-trimming arrangement on high-speed gear shaper, showing feed dial, stops, etc.

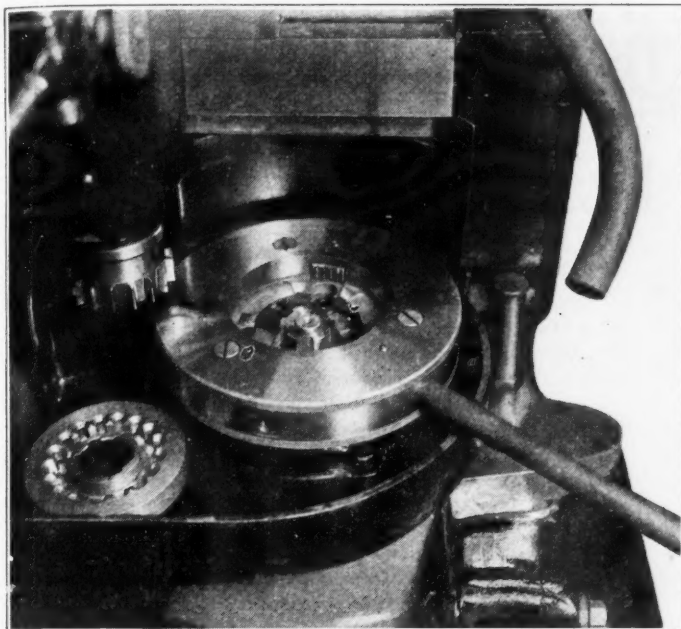
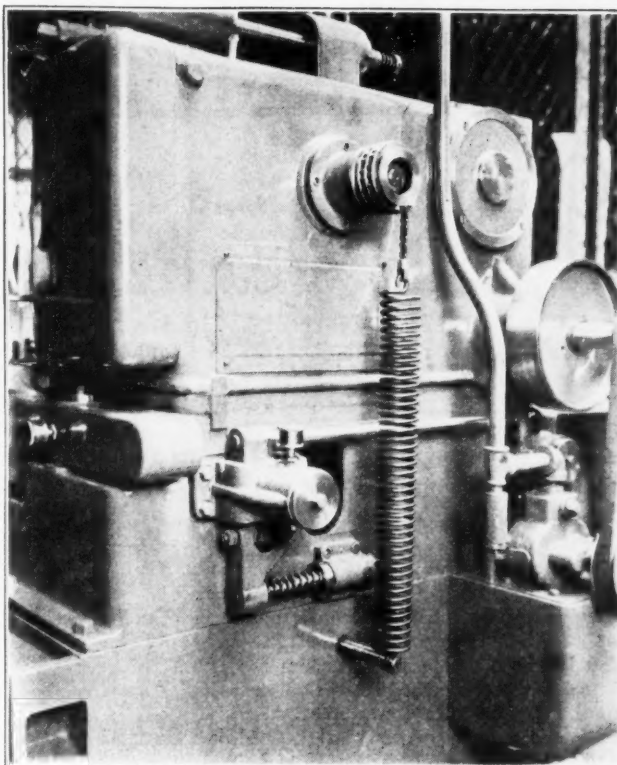


Fig. 3, above: Close view of special three-jaw chuck, showing arrangement for centering and clamping work

Fig. 4, right: Rear view of machine shown in Fig. 3, illustrating special arrangement for imparting rotary relief to work



The work is relieved from the cutter on the return stroke by imparting a slight oscillating movement to the work-spindle, by means of a special relieving device illustrated in Fig. 4. Cutting is accomplished by rotating the cutter while reciprocating. The extent of rotation is controlled by adjustable stops.

Adjustable Stops

In action, the cutter is rotated first in one direction, reversed and then rotated in the opposite direction, thus side-trimming the teeth to any desired width of tooth space within very close limits. The feed controlling mechanism, as previously stated, comprises adjustable stops carried in a feed dial held on the upper feed rod, as shown in Fig. 2. This shaft is driven by the regular feed mechanism of the machine through a double-plate, "spring loaded" friction clutch, which slips when the stops come into action.

The operation of this machine is briefly as follows: The operator places the work in the chuck, locating it by the splined arbor (Fig. 3) in the chuck, and clamps it by the handle shown. The saddle is advanced to the stop, which locates the axes of the work and cutter in the central position. The cutter is centered with the spaces in the work by rotating the feed dial until the spring plunger drops into the centering notch.

Starting the Machine

The operator now starts the machine in operation by moving the countershaft shipper rod. The cutter continues to cut in one direction until the feed is disengaged. The machine is now reversed by operating the shipper rod of the reversing countershaft. The feed dial is returned by hand to the central position, when cutting continues as before, but on the opposite sides of the teeth, until the stop disengages the clutch.

The machine is now stopped, the saddle backed off to withdraw the cutter from the work, and the work removed from the chuck. The entire operation of cutting only takes a matter of seconds, and as the machine can

be easily and quickly operated, the work can be produced very rapidly. In fact, on most clutch gears, the floor-to-floor time is about two minutes per gear.

THE possibility of greatly augmented sales of American automobiles in European countries as a result of judicious advertising in those areas is pointed out in a trade bulletin just issued by the Department of Commerce. In most parts of Europe, the report shows, the automobile is now looked upon as a luxury reserved for the rich. Heavy ownership taxes are levied in many countries, in some instances amounting to 50 per cent of the cost of the car. If the desire to own an automobile were created in a sufficient number of people, it is possible that ownership taxes might be modified and a gasoline tax substituted. With a greatly increased number of cars on the road, the revenue from the gasoline tax, qualified observers believe, would more than equal the present imposts and would provide a constantly increasing fund for highway improvement.

The first step, then, for American manufacturers is to try by advertising to convince the public in European countries that ownership of an automobile need not necessarily be confined to the wealthier classes. American-type advertising would undoubtedly prove effective, providing a certain amount of local color were injected.

The factors influencing the buying public in various localities of Europe differ and this fact must be borne in mind. For example, where the price of gasoline is high, or a high gasoline tax is imposed, the factor of fuel consumption may be stressed in the advertising. American manufacturers can find no stronger points to emphasize than the ease with which an American car can be handled, the freedom from ignition troubles, the low cost of mechanical attention and upkeep, and the interchangeability of parts which insures uniformity of product and facilitates quick repairs at comparatively low cost.

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania

Saturday, March 26, 1927

Output Holds Above 1926 While Weather Spurs Sales

PHILADELPHIA, March 26—Unusually good weather was a marked stimulus to automobile sales in the early weeks of the month. Whether the spring buying season has been advanced through this circumstance to an extent that earlier curtailment will be necessary is of course within the realms of possibility, but there is no escaping the fact that the market has been eminently satisfactory for a majority of the producers. It is the year's volume that counts for the factories, and a shifting of the beginning and end of the most active buying period should cause no disturbance.

The automotive situation as a whole is readily open to misinterpretation. The accepted indices of activity, such as the monthly production totals and the level of employment in the Detroit area, are under the figures of a year ago, yet if a single producer, Ford, is excluded from the figures, the volume of the other companies is seen to be well ahead of the same period of 1926.

Sales in the southern states are showing a noteworthy improvement, and there is a tendency for the factories to turn attention to the wheat belt, where business has not been up to expectations. Generally speaking, the manufacturing areas continue to mark proportionately the best sales condition, the latter including used car as well as new car turnover.

A good export trade is helping to maintain the volume of the factories. Aside from the large number of cars and trucks being shipped from here and from Canadian plants of American ownership, assembly and even manufacturing operations are being increasingly conducted abroad by American capital, and some of this business does not get into the official statistics.

Durant of Canada Betters Position

NEW YORK, March 24—Durant Motors of Canada reports profit for 1926 as \$234,593, as compared with a deficit in 1925 of \$16,963. Current assets as of Dec. 31, 1926, were \$1,709,940, against \$1,405,153 in 1925, and current liabilities were \$195,210 as against \$315,403, leaving a working capital of \$1,514,730, compared with \$1,189,650.

Cash at the end of 1926 was \$869,793, representing a gain of \$590,722 for the year. Inventory was \$581,697, against \$1,024,185 in 1925.

Sam Miles Recovering

NEW YORK, March 23—Sam A. Miles, show manager of the National Automobile Chamber of Commerce, has been undergoing treatment at the Harbor Sanitarium here and is recovering rapidly.

Durant's Plans Give Rise to Speculation

Authoritative Circles Think
Aggressiveness Will Center
on His Present Concerns

NEW YORK, March 24—Just what William C. Durant will announce on April 7 remains largely in the realm of speculation, but opinion in authoritative financial and automobile circles here is that his present plans contemplate aggressive measures to further the interests of his present automotive concerns rather than for the acquisition or merging of other ones, although rumors to that effect persist.

The printing of an advertisement in a Long Island newspaper, saying "Durant Back on the Job," in conjunction with a promise of full particulars of a "startling" nature later on, threw a bombshell into Wall Street, unsettling the market and loosing a flood of rumors of a battle of automotive giants.

Mr. Durant and his associates have withstood firmly all requests for an inkling of the moves proposed and all of a tangible nature that has developed is the naming of John S. Hunt as general manager in charge of the activities of the Durant company, and price reductions on the Flint line. Mr. Hunt is well known in the industry through his former connection with the Chevrolet Motor Co. and more recently with the Hayes-Hunt Corp.

Efforts to reach Colin Campbell, vice-president of Durant Motors, who has been in general charge of sales policies, were made here and in other cities but were unavailing.

Some color was lent to the merger stories by Mr. Durant's statement that henceforth all other interests would be secondary to automobile manufacturing. Concurrently it was reported in Wall Street that he was liquidating his position in several important stocks in which he is widely credited with having made large profits.

NEW REO FOR \$1,200

SIX CLASS CERTAIN

DETROIT, March 23—Rumors prevalent during the last few months that Reo Motor Car Co. was bringing out a car to compete in the low-priced six field, have been definitely settled by an official of the Reo company in a statement to the effect that a companion car to the Flying Cloud will be announced to the public May 6.

The car is to sell in the \$1,200 price class and will be powered with a six-cylinder, 3¼-in. bore engine developing 55 hp., and equipped with a seven-bearing crankshaft. While considerably shorter than the Flying Cloud, it will be longer than other sixes in the \$1,200 class.

But while it is not doubted that Mr. Durant ultimately proposes another big merger of producing companies, it is believed that any definite moves along these lines are in the indefinite future. The original statement from Mr. Durant on this point said he "purposes to devote his entire time, with every other consideration secondary, to a thoroughly constructive motor car program that will duplicate his previous and widely known accomplishment in this field."

Stock Market Winnings

Ever since Mr. Durant was injured in a railroad wreck in the South early last winter discussion has been prevalent with respect to his eventual plans. He was generally understood then to have withdrawn from active participation in the companies he had organized. His recent announcement proves that he is thoroughly recovered and ready to take the aggressive again. His stock market winnings, although doubtless greatly exaggerated, now seem to have been realized to a large extent, whereas the \$100,000,000 paper profits in General Motors collapsed to an insignificant fraction of that sum.

New Ford to Have 4 Speeds Forward

DETROIT, March 23—It is now reported the new Ford car will have a two-speed planetary transmission in conjunction with a two-speed gear on the rear axle, which will give it four forward speed changes. The use of a change gear on the rear axle, whereby the axle can be disconnected from the planetary transmission, has necessitated a rearrangement of the braking system.

Car Makers to Enter Tire Field, is Report

Akron Interests Agog Over Rumored Intent—Denials Are Made

AKRON, March 23—Reports are being bruited about in tire manufacturing circles here to the effect that several of the important automobile manufacturing concerns are contemplating entry into the tire-making field. Obvious reasons are being cited as the motivating factors. They are that elimination of tire manufacturers' profit would enable the car maker to obtain original equipment at the lowest possible cost; enable him to furnish his dealers with allied merchandise to enhance their earning capacity, and thus place himself in a very strategic position with regard to competition.

One of the major automobile concerns is prominently mentioned in the rumors.

A number of tire firms are likewise mentioned, but the name of Ajax Rubber Co., of New York, recurs most persistently.

Car Maker Denies Report

NEW YORK, March 23—Reports actively circulated recently, to the effect that a leading motor car manufacturer had acquired, or was negotiating for, a tire manufacturing company are denied by a high official of the automobile company involved in the reports.

Doubt is expressed in the trade generally that such a move would be advantageous, due to the very low prices which the factories have been able to obtain through the competition of independent tire companies for original equipment business.

Austin-7 to be Made and Sold in Germany as Dixi

BERLIN, March 12 (*by mail*)—The Fahrzeugwerke Eisenach, belonging to the Gothaer Waggon-Werke, which up to the present built the Dixi car, has taken over the license for the British Austin-Seven car, which it will now produce under the name of Dixi. It has acquired production rights not only for Germany, it is said, but also for "East Europe." This is a significant success for the British small car industry.

Automotive Firms Share in Government Contracts

WASHINGTON, Mar. 23—The government will spend approximately \$1,500,000 in the purchase of automotive equipment to be used by Agricultural Department experts in their \$10,000,000 campaign to eradicate the cornborer, it was announced here this week by the Department. Automotive companies sharing in the awards follow:

Ford Motor Co., 360 tractors, \$173,577; International Harvester Co., 800 stubble beaters, \$102,202.50; Deere & Co., 440 tractors, two cylinder, 15-27 hp., \$281,922; International Harvester Co., 440 tractors, four cylinder, 15-30 hp., \$283,091; Federal Motor Truck Co., 64 oil burning apparatus, \$482,014; Donohoe Motor Co., Washington, D. C., 150 ½-ton steel box body trucks, \$62,016; Willys-Overland Co., 43,365, for 75 coupes; Donohoe Motor Co., 44 one-half ton canopy top trucks, \$20,164.26.

\$73,125,000 Allotted for Federal Road Aid

WASHINGTON, Mar. 23—Federal-aid highway allotments for the fiscal year beginning July 1, 1927, announced here this week by the U. S. Bureau of Public Roads, total \$73,125,000. The amount will be allocated to the various states, for use on approved projects within the 185-mile network of the national highway system. With the states shares added to this figure the appropriation will provide for the paving of between 6000 and 8000 miles of hard-surfaced highways throughout the country.

Texas, allotted \$4,497,272, shares largest under the Federal-aid allotments. Other leading states are: New York, \$3,635,217; Pennsylvania, \$3,335,735; Illinois, \$3,154,429; Ohio, \$2,762,000; Michigan, \$2,214,691, and California, \$2,483,000.

South America Will be Taught Truck-Bus Uses

NEW YORK, March 23—George F. Bauer, secretary of the Foreign Trade Committee of the National Automobile Chamber of Commerce, will leave New York April 9 for a four months' speaking tour in South America, in the course of which he will give the first showings of the motion picture films demonstrating uses to which buses and trucks are being put by railroads and which is being produced under direction of John V. Lawrence, of the Chamber, who is taking scenes at St. Louis and Cincinnati.

Resolution by N.A.F.C.

CHICAGO, March 26—The National Association of Finance Companies has proposed a resolution for the consideration of the United States Chamber of Commerce at its annual meeting in Washington, May 2 to 5, calling upon Federal and state authorities to prosecute all prohibition violation cases in which automobiles figure under the Volstead Act rather than under any other Federal or state laws.

Leases Berlin Plant

BERLIN, March 12 (*by mail*)—Chrysler has leased a large German factory property in an industrial suburb of Berlin called Johannistal for the purpose of assembling its cars on the spot.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, March 24—Trade and industry registered further moderate gains in activity last week. Retail business in particular was in larger volume, due in part to the prevalence of good weather. Steel production was reported to be nearly at the highest rate on record. Commodity prices in general receded further, while stock quotations, in an extremely active market, moved toward higher levels. There was little change in money rates, although the tone of the market was slightly easier.

FREIGHT CAR LOADINGS

Railway freight loadings during the week ended March 5 numbered 994,931 cars, as against 923,849 cars in the preceding week (a holiday week) and 965,009 cars in the corresponding period last year. Excluding coal shipments, however, loadings were slightly smaller than a year earlier.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended March 16 were 18.1 per cent above the total for the preceding week and 8.5 per cent above that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 139.6 last week, as against 141.4 a week earlier and 142.1 four weeks earlier. The monthly wholesale price index of the Bureau of Labor Statistics for February was 146.4, which compares with 146.9 in January and 155 in February last year.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks increased \$37,200,000 during the week ended March 16, declines of \$85,400,000 in discounts and \$45,800,000 in open market purchases being more than offset by a gain of \$168,400,000 in holdings of government securities, due to the financial operations of the Treasury. Note circulation declined \$12,700,000, while deposits increased \$62,300,000 and reserves \$11,600,000. The reserve ratio declined from 79.7 to 79 per cent.

During the same period, loans of reporting member banks increased \$105,000,000, with a slight decline in loans secured by government obligations and gains of \$73,000,000 in loans secured by stocks and bonds and \$35,000,000 in "all other" loans. Investments rose \$290,000,000, net demand deposits \$305,000,000 and government deposits \$252,000,000, while time deposits declined \$31,000,000 and borrowings from the Federal Reserve banks \$76,000,000. Loans to brokers and dealers secured by stocks and bonds made by reporting member banks in New York City increased \$22,000,000.

E. A. Ross Becomes Ross Gear President

**D. L. Ross Named Chairman
of Board—Capitalization
Increased \$3,000,000**

LAFAYETTE, IND., March 21—Ross Gear & Tool Co. has been reorganized with Edward A. Ross as president. Capitalization of the company has been increased by the issuance of \$3,000,000 of common stock, none of which is offered for public purchase. Under the reorganization, David E. Ross is resigning as vice-president and general manager and as a director but retaining his stock in the company. D. L. Ross, who has been president and treasurer, becomes chairman of the board.

Other officers of the reorganized company are Eugene Gruenewald, vice-president; F. F. Chandler, vice-president; H. A. Dick, vice-president; Roy M. Reser, secretary, and A. F. Kanne, treasurer. Mr. Gruenewald has been factory manager since 1922; Mr. Chandler chief engineer since 1922; Mr. Dick Detroit representative since 1916; Mr. Reser purchasing agent since 1914, and Mr. Kanne credit manager since 1919.

The Ross Gear & Tool Co. was organized in 1906 with a capitalization of \$50,000 in common stock. This was increased to \$100,000 about 1910, and in 1912, \$100,000 in preferred stock was issued. On the death of William Ross, first president in 1913, D. L. Ross became president and treasurer.

With the introduction of the cam and lever steering gear about four years ago the company has enjoyed rapid growth, now supplying steering equipment to about half of the passenger car makers and to a majority of manufacturers in the bus and truck field. The company had an increase of about 50 per cent in its 1926 business and reports indications of a similar increase in its 1927 sales.

Fred M. Randall

DETROIT, March 22—Funeral services for Fred M. Randall, president and founder of the Fred M. Randall Co., advertising agency, who died suddenly March 19, were held today. Mr. Randall was born in Ripley, N. Y., 49 years ago, and upon graduating from high school at Westfield, N. Y., entered Cornell University, being graduated in 1900. After he came to Detroit he was made a trustee of Cornell, the first mid-westerner to be given this honor. Mr. Randall was also president of the Cornell University Association of Michigan. He was prominent in Masonic circles.

Through his activities in the advertising field, Mr. Randall became well known in the automotive industry. At the time of his death his company was advertising representative for the Morse Chain Co., Federal-Mogul Corp. and the Hastings Manufacturing Co.

BAY STATE KILLS INSURANCE CHANGE

BOSTON, March 19—Plans to make changes in the Compulsory Insurance Law were checked in the Massachusetts Legislature this week when the bill sponsored by Representative La Brecque of Quincy providing for a uniform coverage all through the state was killed. Mr. La Brecque objected to the section whereby the people living in large cities pay a larger rate than those living in the suburbs. There now are three zones graduating downward in prices. Despite his argument the Legislature refused to pass his bill. Also the bill providing for a flat rate, for all vehicles, to be turned over to the state, out of which damages would be paid, was shelved. This latter paves the way now for an initiative petition to put it on the ballot in the 1928 election.

American Chain Offers New 7% Preferred Stock

NEW YORK, March 21—A syndicate headed by Dillon, Read & Co., and Hemphill, Noyes & Co. this week sold the unsubscribed portion of an issue of \$11,000,000 American Chain Co., Inc., 7 per cent preferred stock with stock purchase warrants. The price was par and accrued dividends.

The purpose of the issue will be to retire at \$30 per share \$8,500,000 outstanding Class A stock and for other corporate purposes. Rights to subscribe to present issue were offered to holders of Class A stock and all but \$4,500,000 was thus subscribed. This amount is now being offered to the public.

Earnings of the company for the last four years have averaged \$2,411,000, or about three times the annual dividend requirements on the preferred stock. After deduction of preferred dividends these earnings were equivalent to \$6.50 a share on the 250,000 shares of common stock outstanding. The balance sheet as of December 15, 1926, showed total assets of \$30,000,000 with current assets of \$13,619,000 against \$1,585,000 of current liabilities.

Dulany Heads Climax

CLINTON, IOWA, March 19—Directors and officers of the Climax Engineering Co. were elected at the annual meeting of stockholders as follows: George W. Dulany, Jr., president; E. P. Denkmann, vice-president; M. M. Cruise, treasurer; Jennie M. Thompson, secretary; R. C. Rowan, general manager. The plant now employs 300 people in its engine, Diesel engine and newly established refrigerating departments. February was reported to have been a record sales month for the company.

O. B. Mueller Buys Port Huron Company

**Takes Controlling Interest in
Brass Company and Sells
Other Interests**

DETROIT, March 21—Controlling interest in the Mueller Brass Co. has been purchased by Oscar B. Mueller, president, from the Mueller Co., Decatur, Ill., it was made known at the annual stockholders' meeting held in Port Huron, March 15. It was also announced that Mr. Mueller has disposed of his interests in the Mueller Co. of Decatur, and Mueller, Ltd., Sarnia, Ont., and is no longer connected with those concerns. Robert and Philip Mueller, of Decatur, will continue as stockholders and directors of the Mueller Brass Co.

A two-year expansion program at the Port Huron mill will be started immediately. It will involve an expenditure of more than \$500,000 for plant extensions and new equipment. There will be no change in policy of this company, which will continue to manufacture brass rod, brass and copper tubing, brass forgings, castings and screw machine products and brass specialties.

The company enjoyed its most successful year in 1926, shipments exceeding \$6,000,000, an increase of 25 per cent over the previous year. The company now has bona fide orders on its books amounting to \$1,500,000. This is \$250,000 more than it has had at any time in its history and is equal to three months' business. At the present time there are 900 persons employed in all departments, which are running full time with night shifts in some departments. The company expects the present year will equal or better the 1926 business.

Offers Arc Welding Prize

CLEVELAND, March 21—The American Society of Mechanical Engineers has accepted the custody of \$17,500 given by the Lincoln Electric Co. of this city to be awarded as prizes to those contributing the best three papers disclosing new information that will tend to advance the art of arc welding. The contest is open to anyone in the world, the papers to be filed before Jan. 1, 1928, with the council of the society in New York. The awards will be presented at the 1928 spring meeting of the society.

Arthur H. Nicolaus

MILWAUKEE, March 19—Arthur H. Nicolaus, advertising manager of the Heil Co., died March 9 after an illness of only a few hours with pneumonia and influenza. Mr. Nicolaus served the Heil Co. while completing his course at Marquette University, being graduated in June, 1926, with the highest honors in his class.

Washington State Raises Speed Limit

Permits Highway Range to 40
Miles—Defines Recklessness
Matter of Conditions

SEATTLE, March 21—The automobile industry of Washington is gratified at what they term the most progressive legislation passed by any state legislature relative to speed limit on the state highways. The new motor code just passed by the Legislature of the State of Washington makes this the first state to recognize that fast driving is not necessarily dangerous, nor does it constitute reckless driving. The law makers took the position that reckless driving is present whenever the speed of the vehicle is greater than traffic will permit, whether the speed be 20 miles or 50.

The bill raises the speed limit on highways from 30 miles to 40 miles an hour and in the streets of the city from 20 to 25 miles. The act states:

"All persons must drive in a careful, prudent manner and at a rate of speed no greater than is reasonable and proper under conditions existing at the point of operation, taking into consideration the amount and character of traffic, condition of brakes, weight of vehicles, grade and width of highway, condition of surface and freedom of obstruction to view ahead."

This terse paragraph is all there is to the act except, of course, the section dealing with the penalties for violation. The substance of the matter, however, is that those Washington solons, the majority of whom probably own automobiles, recognize the folly of making law breakers out of citizens who speed when speeding is perfectly safe and warranted.

The speed limit formerly enforced in Washington was 30 miles per hour; in Oregon it is the same, while in California the limit is set at 35 miles an hour.

Anderson Control Changed

EVERETT, MASS., March 21—Control of the Anderson Mfg. Co. has been transferred to W. G. Ferguson, W. T. Ferguson and L. W. Newell, who will become active in the management. The resignation of M. W. Vedder is announced, Mr. Vedder going to the Pacific Coast to take care of interests there. G. L. Dernier will continue as sales manager and R. D. Parker as production manager.

The policies and standards of manufacture of the company will be continued by the new owners.

Hexdee Sales Gain 75%

DETROIT, March 21—Sale of Hexdee shock absorbers in February are reported by the Detroit Steel Products Co. to have shown an increase of 75 per cent over January.

ELECTRICAL GROUP PLANS LICENSING

NEW YORK, March 19—The National Electrical Manufacturing Association is planning the adoption of a cross-licensing agreement based upon the plan used by the National Automobile Chamber of Commerce. The association seeks the elimination of the heavy annual expense of litigation brought about by patent disputes.

In the resolution authorizing the formation of a committee to study the possibilities of cross-licensing it is set forth that the N. A. C. C. has demonstrated the practicability of a system of cross-licensing resulting in confidence in and the strong development of the automotive industry.

Shop Equipment Exports Total \$6,860,000 in 1926

WASHINGTON, March 22—Sale of U. S. automobile service appliances for garages and automobile shops in foreign countries is showing an unprecedented growth, totaling in 1926 the sum of \$6,860,000, according to export figures for such equipment just announced by the U. S. Department of Commerce. The increased foreign business of automobile manufacturers in the sale of trucks and cars is a factor, the report states.

The United Kingdom is the largest export market, taking \$2,168,000 worth of service equipment in 1926; France is second with \$648,000; Canada third, with \$475,000, and Australia fourth, with \$439,000.

Industry Absorbs 58% of 1926 Aluminum Output

WASHINGTON, March 23—Aluminum produced in the United States during 1926 was valued at \$36,583,000, of which 58 per cent was used by the automobile industry, according to census figures announced this week by the U. S. Bureau of Census. The 1926 yield was .05 per cent greater than the 1925 yield.

Virgin aluminum of 99 per cent grade was quoted at 28 cents a pound until the middle of July, then a 1 cent average drop was reported. The report states that world capacity to produce aluminum has been so greatly enlarged since the war that production has outgrown consumption.

Marathon Battery Builds

WAUSAU, WIS., March 19—Marathon Battery Co. has made public plans for the erection of a new plant costing about \$750,000. The new plant will be 100 x 240 ft. and will enable the company to treble its present capacity. W. H. Thom is president and general manager.

Tax Repeal Before A.A.A. Congress

Owners Also Will Act on
Compulsory Insurance and
Other Problems

WASHINGTON, March 23—Six major problems of interest to the millions of automobile owners of the country will be the principal business considered at the Motor Congress this week under the auspices of the American Automobile Association. The congress will be attended by representatives of 862 automobile clubs affiliated with the A.A.A.

The program, as outlined by President Thomas P. Henry, is as follows:

(1) Safety and universal acceptance of the Uniform Motor Vehicle Code, developed by the Hoover Conference on Street and Highway Safety; (2) Steps toward abolition of the "fee system" of road side courts; (3) Compulsory Automobile Insurance; (4) Repeal of the 3 per cent excise tax on passenger cars; (5) Abolition of the "gyp automobile and fly-by-night" clubs and associations, and (6) Means to secure greater solidarity in motordom through an intensive campaign for building up motor club membership and through greater cooperation between motor clubs, automobile manufacturers, dealers and civic bodies.

Says New Congress to End Excise Tax

WASHINGTON, March 23—A prediction that the Seventieth Congress will repeal the 3 per cent war excise tax now imposed on passenger cars, was made here this week by John N. Garner, of Texas, ranking Democrat on the Ways and Means Committee. The statement was made in connection with a Republican view that as a result of Republican economies in the White House there will be next year a surplus of \$500,000,000 in the Federal government's income.

"The President has said that as soon as the Treasury's condition would warrant it, there would be general tax relief. They now predict a surplus of \$500,000,000 in 1928. The Republicans will have the whole-hearted cooperation of the Democrats in a non-partisan program to lop off the tax burden at the next session and undoubtedly it will come, including the repeal of the automobile tax," Mr. Garner said.

Black & Decker Sales Gain

BALTIMORE, March 21—Business of the Black & Decker Mfg. Co. for the first two months of the year shows a 20 per cent increase over the same months last year, according to a statement by S. Duncan Black, president.

M. & A.M.A. Reports Continued Gains

Original Equipment Shipments Near 1926 Rate—
Shop Equipment High

NEW YORK, March 25—With a 25 per cent gain in February shipments over January, business in automotive parts and accessories is approaching closely the high production and sales levels of a year ago, according to the Motor & Accessory Manufacturers Association, which reports further progress by members in March.

The dollar volume for all groups of M. & A. M. A. members in February reached an index figure of 146, based on January, 1925, against 126 in January this year and 154 in February of last year.

The most striking gain was made in shipments of original equipment, indicating a sharp upswing in car and truck production, a trend which is generally being continued in March. The index figure for this group stood at 158 in February against 132 in January and 160 in February a year ago.

Another notable gain was made in February by service equipment manufacturers. Shipments in this division advanced in February to an index of 155 as compared with 140 in January and 158 in February a year ago.

Shipments to the wholesale trade of replacement parts makers dropped from an index of 107 to 100, a frequent seasonal development, while accessory business advanced to 93 from 79 in January. Accessory shipments for some companies were held up earlier by large stocks in dealers' hands.

Parts and accessory business has been affected favorably in the case of some companies and adversely in others by the current situation in car and truck production which shows the majority of the makers increasing volume slightly over the early weeks of the year, while a small number of producers are making phenomenally rapid gains. Trade sales of the parts industry, particularly in the shop equipment lines, are expected to benefit from the steadily increasing registration of vehicles.

Excise Tax Receipts Drop

WASHINGTON, March 23—Excise taxes collected from the automobile industry during February totaled \$2,579,997, compared with \$7,135,257 collected in February last year. Figures just announced by the Treasury Department, show that the total tax collected for the first eight months of the fiscal year ending March 1, was \$42,438,127, compared with \$77,957,403 collected during the same period last year.

Elcar Adopts Fedco

ELKHART, IND., March 21—Elcar Motor Co. has adopted the Fedco system of theft protection on all its models.

FEBRUARY OUTPUT SHOWS 67,508 GAIN

WASHINGTON, March 22—Production of cars and trucks by United States and Canadian factories in February totaled 317,014, comparing with a January total of 249,518 and with a February, 1926, total of 376,308. United States factories show 260,330 cars and 38,029 trucks in February as against 196,973 cars and 37,169 trucks in January, and 319,763 cars and 37,707 trucks in February last year. Low Ford production held the month's total low despite gains by many other leading companies.

Canadian factories show 14,826 cars and 3829 trucks in February against 11,745 cars and 3631 trucks in January and 14,761 cars and 4077 trucks in February last year.

	Cars	Trucks	Total
Jan.	284,703	33,517	318,220
Feb.	334,524	41,784	376,308
Total ...	619,227	75,301	694,528
March	399,105	49,386	448,491
April	401,836	54,135	455,971
May	394,569	51,568	446,137
June	358,388	47,265	405,653
July	329,959	41,873	371,832
Aug.	393,064	47,836	440,900
Sept.	363,547	51,257	414,804
Oct.	300,160	46,985	347,145
Nov.	226,278	39,430	265,708
Dec.	143,413	30,161	173,574
Total ...	3,929,546	535,197	4,464,743

	Cars	Trucks	Total
Jan.	208,718	40,788	249,506
Feb.	275,156	41,858	317,014
Total ...	483,874	82,646	566,520

New Pontiac Plant Opens, Capacity Now 1360 Daily

PONTIAC, March 22—With the new Pontiac car plant of Oakland Motor Car Co. now in production, the total output of Oaklands and Pontiacs in March will approach closely to the highest single production month ever recorded by the company. The April schedule has been increased to 19,000 which will set a new high monthly mark. With the Pontiac plant in full operation it will have an output of 1000 daily on this car alone, with 360 Oaklands being turned out in the older plant.

Gramm Shows Large Gains

DELPHOS, OHIO, March 19—A large gain in orders received in the early days of March is reported by B. A. Gramm, president and treasurer of Gramm Motors, Inc.

Truck and coach orders in February showed an increase of 490 per cent over February business last year. Of the February orders 68 were for Gramm vibration-proof coaches. March orders include 30 coaches and 50 truck chassis for export trade.

N.S.P.A. Develops Reference Tables

First Standardized List Covering
Connecting Rods and
Bearings Now Complete

DETROIT, March 22—A standardized alphabetical and dimensional reference table, assigning standardized stock numbers, covering all lines of replacement parts, is being compiled by the National Standard Parts Association. The catalog committee, meeting in Detroit, last week, reported that complete data for connecting rod and main rod bearings, the first classification to be covered, will be ready within a few days. It was also stated that material for the second group—pistons, is more than 50 per cent complete.

The association plans to cover 18 major lines of replacement parts as the first step in this program. The first nine will be treated in the following order and will be released when completed: Connecting rod and main rod bearings; pistons; piston rings; piston pins; valves; spindle bolts and bushings, steering knuckles and bushings and tie rod bolts and bushings; bushings; ring and pinion gears, and flywheel ring gears.

The system will provide complete interchangeability of parts, with standardized stock numbers and a code word for each part listed. The tables will cover every car, truck, tractor and engine made during the last eight years. The association expects to effect great economy in printing costs through this work, as all the manufacturers in each classification can use the same plates. Because the work will be done by only one printer a volume will be reached that will provide considerably lower cost.

Through simplification of the alphabetical and dimensional tables it is expected to make the jobbers task much easier by making required information much more accessible than it has been heretofore, while the uniformity in parts numbers which the system will provide promises a common basis for referring to parts that will likewise save time and effort.

Thompson Products Opens Newark Factory Branch

CLEVELAND, March 19—A fifth factory branch of Thompson Products, Inc., has been opened at 33 William St., Newark, N. J. One more branch soon to be established in the southeast, will complete a chain at principal points of automotive distribution announced a year ago. This will give jobbers in practically all territories 24-hour service on shipments from complete branch stocks, according to Burke Patterson, service division sales manager.

The Newark branch is in charge of C. W. Sawyer under the supervision of J. A. Bell, district manager.

Steadiness Marks Price Situation

Reductions Show Little Effect on Sales—Lincoln and Flint Reduce

PHILADELPHIA, March 23—Despite price revisions by the Lincoln division of Ford Motor Co. and by Flint Motor Co. during the past week, the price situation in the industry continues to be marked by general steadiness. Retail business has been coming along nicely, with the largest share of business continuing to go to those companies whose prices have remained consistently pegged over long periods.

There is every evidence that price reductions are having little, if any, effect upon the businesses of those companies which have taken no price reduction action, in fact one of the busiest companies of the present season recently made effective slightly higher prices. Several companies which have made price reductions, reported largely stimulated sales immediately following, but there is no indication that these were sales taken from companies not reducing.

The new Lincoln prices follow:

	New	Old
Sport Phaeton	\$4,600	\$4,700
Sport Touring	4,600	4,700
Sport Roadster	4,600	4,700
4-Passenger Coupe	4,400	4,800
4-Passenger Sedan	4,800	5,000
5-Passenger Sedan	4,800	5,100
7-Passenger Sedan	5,000	5,300
7-Passenger Limousine	5,200	5,500

The new Flint prices are:

	New	Old
5-p. Coach	\$795	\$960
5-p. De Luxe Coach	\$895	\$1075
Roadster	discontinued	\$1369
5-p. Touring	\$1250	\$1260
4-p. Sport Roadster	\$1350	\$1495
4-p. Coupe Roadster	\$1395	\$1495
5-p. Sedan	\$1395	\$1495
5-p. Brougham	\$1395	\$1450
80 (120 in. W. B.)		
4-p. Roadster	discontinued	\$1645
4-p. Sport Touring	\$1595	\$1645
4-p. Coupe	\$1795	\$1850
5-p. Sedan	\$1850	\$1925
(130 in. W. B.)		
7-p. Sedan	New Model	\$1595
7-p. Sedan	\$2050	\$2125

Graham Sales Increase

DETROIT, March 19—Production of Graham Brothers vehicles has been increased in anticipation of heavy spring demands, according to Dodge Brothers, Inc. A total of 4255 Graham Brothers units were sold in January, the best January in the division's history, while sales in February aggregated 5093.

Willys Sells Seattle Branch

SEATTLE, March 21—One of the largest automobile deals in the history of the Northwest was consummated at Seattle when the Willys-Overland factory branch there was sold to the

Transport Motor Co., distributor of Willys-Knight and Whippet cars in eastern Washington, Idaho and Montana. An annual volume of approximately \$2,500,000 is involved in the transaction. The territorial lines of the new organization are enlarged to embrace Washington, Idaho, western Alaska and Alaska. Seattle also will serve as headquarters of the entire organization.

Registrations Show Gains in February

PHILADELPHIA, March 23—Reports on new car registrations from several sections indicate a large volume of both new and used car retail sales in February. In the New York and Cleveland districts new high February records were scored. Indiana showed an increase over the same month last year.

Cleveland Reaches New High

CLEVELAND, March 21—An upturn in the retail automobile business in Cleveland was revealed in figures compiled by the Cleveland Automobile Manufacturers & Dealers Association. Final tabulation of bills-of-sale for new and used cars revealed increases over the same month last year and the largest total for any February on record.

Last month bills-of-sale for new cars filed in the county clerk's office totaled 2268. This is an increase of 104 over the total of 2164 for February of last year. February used car sales showed a total of 8364 as compared with 7804 for the same month last year.

New York Sets Record

NEW YORK, March 19—February sales of passenger cars in the metropolitan district established what is believed to be a new record for the month. They totaled 5008 vehicles against 3364 in February of 1926, according to Sherlock & Arnold's figures. The gain over January business was also notable, that month's total having been 3616.

Indiana Exceeds 1926 Total

INDIANAPOLIS, March 19—New car sales in Indiana during February failed to attain the volume attained in January, according to the monthly compilation by the Indianapolis Automobile Trade Association. However, February's total of 6593 ran ahead of the 5326 total for the same month last year and the total for the first two months of this year, 14,729, compares with but 11,142 for the same two months of 1926.

Ajax to Move Offices

NEW YORK, March 23—The executive offices of Ajax Rubber Co. will be moved from New York to Racine, Wis., where executive and operating divisions will be concentrated. This is believed to be the step referred to by J. C. Weston, president, which was to have resulted in a saving of \$1,000,000.

Mack Development Adds 99 Buildings

Program Now Nearing Completion Improves Production and Sales Facilities

NEW YORK, March 22—Mack Trucks, Inc., is rapidly nearing completion of one of the most extensive building programs ever undertaken by an automotive manufacturer. The sales and service branch of the company will have 99 buildings in operation, while the rearrangement of factory facilities will increase production capacity and enable more effective assembly of vehicles and distribution of parts.

Last year nine buildings were completed, at Chicago, Milwaukee, Minneapolis, St. Paul, Tampa, Jersey City, Camden, White Plains, Bridgeport and Worcester, and a building was purchased in Baltimore. Construction work has been started in Rochester and Albany, and an extension begun which will double capacity in Boston. The total floor space available, when the present work is completed, will be 70 acres. Of this 20 acres, comprising 21 buildings, were added in 1926.

The Plainfield (N. J.), plant of the Niles-Bement-Pond Co., which was acquired last year, is being made the general service depot and will soon be in full operation. This will relieve pressure at the New Brunswick plant where parts had formerly been stored for servicing.

Under the new policy of the Mack company, sales and service buildings, as well as the land, is owned by the factory as this has been found of great benefit in building local goodwill for Mack products and Mack service. It also makes possible the building of plants on a model plan which the company has developed out of its experience with the needs of truck and bus operators.

Falcon Names 5 Dealers, Production Now 60 Daily

DETROIT, March 21—Appointment of dealers at five important southern points was announced by Falcon Motors Corp. The appointments were: F. E. Maffett, Inc., Atlanta; Bringier, Inc., New Orleans; Imperial Motor Co., Inc., Mobile; Henderson Motor Co., Tampa; Stauffer Motor Co., San Antonio.

The first Falcon-Knight cars were produced in the factory at Elyria on March 15. The output on the first day was 12 cars, while production for the remainder of the week brought the total up to 75. On March 21, production was advanced to 60 cars a day.

SKF in New Offices

NEW YORK, March 22—SKF Industries, Inc., has moved its offices to 40 East Thirty-fourth St., where it will have much larger office space and will be in a more central location.

Light Trucks Gain in Mid-West Favor

Longer Distance Deliveries
Are Made Possible With
Growth of Road Systems

KANSAS CITY, March 19—Truck sales in the Kansas City territory have taken a new turn—a turn where the demand for the heavy duty type is turning to a truck where more speed can be obtained even though the load is lighter. Virtually every truck dealer and distributor in this city has noted the trend and various reasons are assigned as to the basic reason other than the demand for speed and flexibility.

Some assign the fact that highways in Missouri are being barred to the use of certain type trucks and overloaded trucks and that further restrictions are proposed in both Missouri and Kansas. But the most general view is that tests have proved the lighter and more flexible truck more practical for all-around use—that only in the handling of extra heavy materials is the heavy type truck necessary.

Also, the fact many business concerns operating fleets, are making deliveries to more distant points as highway improvements go forward, is advanced as a reason. On these longer hauls speed is more vital than tonnage.

The business outlook for truck dealers and distributors here is more favorable than in several years.

The economic situation in the Middle West is very encouraging. The wheat in Kansas and Oklahoma is in excellent shape, coming through the winter nicely. The coal and lead mines are booming as are the oil fields of Kansas and Oklahoma.

Weather Improves Bay State Business

BOSTON, March 19—That the tide has turned somewhat in the buying of cars, at least as shown from the registrations up to March 1 in Massachusetts, seems evident by the figures issued by the Motor Registration Department. When January ended it showed that the Bay State was about 34,000 vehicles below the same period of 1926, of which more than 5000 were trucks.

Now February comes through with an increase of registrations over the same month a year ago of nearly 70 per cent. This seems to be the result of the Washington's Birthday openings in Boston and better weather conditions.

The February figures show 25,285 cars this year against 13,616 a year ago, a gain of 11,669. Such a big jump has given the dealers and salesmen encouragement. The truck figures show a loss of 448 this month bringing the loss for the year to 6043. The month's figure for these vehicles was 2370 this

CROSSING TUNNEL TRIED IN DETROIT

DETROIT, March 19—Detroit will build its first pedestrian tunnel under Cass Ave., at Peterboro and, if it proves successful, will build similar tunnels in many parts of the city. The tunnel will make it possible for pupils of a nearby school to cross Cass Ave., one of the busiest traffic arteries, without dodging automobile traffic. The council has appropriated \$9,000 for construction work.

year against 2816 in 1916. The cut-down in passenger car totals from a loss of 28,785 up to Feb. 1 this year to 17,116 loss to March 1 shows what can be accomplished by a stretch of good weather.

Heavy Rubber Arrivals Hold Spot Price Steady

NEW YORK, March 21—Continued heavy arrivals of crude rubber in the United States have served to prevent the spot price rising much above 41 cents despite increased buying by factories. Henderson, Helm & Co. believe that unexpectedly large shipments from the East may reflect an earlier absorption of the unused coupons than was generally anticipated.

As tending to bear out this theory, London stocks of March 11 reached a new high of 61,516 tons, an increase of 1571 tons during the week. It is estimated, however, that there will be a decrease of 400 tons this week, the first time since Nov. 27, 1926, that the London supply has failed to show a gain.

The London average spot price from Feb. 1 to March 16 was 19.411 pence. An average of 22.678 pence is necessary for the rest of the quarter to raise the quarterly average to 21 pence and prevent further restriction.

Norway Survey Favors Billion Crowns for Roads

WASHINGTON, March 19—Expenditure of more than 1,000,000,000 crowns for the extension and improvement of Norway's existing road system is proposed in a report of a governmental commission appointed in 1919 to investigate the transportation requirements of the country, according to word received by the U. S. Department of Commerce.

The plan contemplates making available at the close of a 20-year program a total of 64,000 kilometers of road, of which about 12,500 kilometers will be main roads.

Chambersburg Opens Office

DETROIT, March 19—The Chambersburg Engineering Co., Chambersburg, Pa., has opened offices in the Stephenson Building here. Racine Ripley is manager in charge of the Detroit territory.

N.A.C.C. Gives \$6,500 for Safety Essays

Accident Report for 1926
Shows 12 States to Have
Lower Fatality Rate

NEW YORK, March 21—Although highway fatalities in 1926 totaled 20,819, according to the report of the National Automobile Chamber of Commerce, and represented an increase of 5 per cent over 1925, for the first time in American highway history, 12 states brought about a lowering of their fatal accidents.

In 1925 only eight states showed an improved traffic record. Classification for 1926 shows 12 states with better records, 23 with a smaller total and 13 not reporting. As there was a 10 per cent gain in car and truck registrations during the year, the gain in fatalities of only 5 per cent is considered a favorable omen.

Coincident with the release of these figures it was announced that the N.A.C.C. has donated \$6,500 in prizes in connection with the sixth annual safety campaign, to be conducted by the Highway Education Board.

The major portion of the sum will go to elementary school pupils, who are being asked to write 500-word essays on "Why I Should be Taught Street and Highway Safety at Home and at School." One thousand dollars will go to teachers for the best safety lessons.

Oil Power Conference to Award Diesel Medal

NEW YORK, March 21—Oil Power Week will be staged nationally by the Oil Power National Conference from April 18 to 23 to focus general attention on the production of power by oil. Meetings will be held in all leading centers throughout the United States on the subjects of oil engine fuels, engine design, operation, economics, trends, research problems, etc. A cash prize of \$100, accompanied by a suitable certificate known as the Rudolph Diesel Award, will be given for the best contribution toward the advancement of oil engines, either in the form of a paper presented at one of the meetings under the auspices of Oil Power Week, or a written discussion of a paper, by anyone attending one of these meetings.

White Orders Increase

CLEVELAND, March 19—President Walter C. White reports that, as a result of enthusiastic acceptance of the new merchandising policy of the White Co., orders for the first two weeks in March showed an increase of 75 per cent over the previous month, and greater than the same period last year. March, 1926, was the biggest March in White history. Factory production schedules have been increased, particularly on $\frac{3}{4}$ -ton and $1\frac{1}{2}$ -ton trucks.

Industry Leader in Steel Market

Consistent Ordering Insures Good Production Basis to May 1—Prices Satisfactory

NEW YORK, March 24—Motor car manufacturers and parts makers continue to play the leading part among buyers in the steel market. Their orders, while consistent with the general policy of the automotive industries not to anticipate raw material wants any more than necessary, are sufficiently large in the aggregate to assure to quite a few steel manufacturers, catering chiefly to automotive consumers, sufficient business to carry them through until May 1.

Demand is spread fairly uniformly over all automotive steels. The leading Ohio producer of automotive alloy steels is operating at 90 per cent of capacity. Cold-finished steel bars come in for excellent demand. Sheet-rollers report a larger number of orders and a better average tonnage for each order, special fender-stock being in particularly good demand. Strip-steel mills are still busy on orders placed earlier in the month.

The cold-rolled strip steel market is more nearly on a 3 cents base, Pittsburgh or Cleveland, than it has been in some time. The new price list for bolts and nuts, which goes into effect April 1, and which shows advances in some cases and reductions in others, has brought out considerable business that was hanging fire. Hot-pressed and cold-punched nuts are now priced by the piece instead of, as formerly, by the pound, and subject to a percentage instead of cents per pound discount. No changes have been made in tire bolts which are not included in the new list.

Steel producers generally appear to be well satisfied with going market prices but do find fault with the general reluctance of automotive consumers to commit themselves beyond their April requirements. However, they admit that if they were in the same position as automotive consumers, they would quite likely adopt the same cautious policy in their purchases. Whether the steel industry expects or does not expect a coal strike, it certainly is preparing for that eventuality, not merely in the accumulation of all fuel for which storage space can be found, but also in withholding basic pig iron from sale.

Pig Iron—Automotive foundries have placed orders for round tonnages of foundry and malleable iron. The Detroit market is now firm at \$19.50, furnace.

Aluminum—Last year's production of remelted aluminum and secondary alloys is estimated by Dr. Robert J. Anderson as having reached the stupendous total of 100,000,000 lb., almost six times what it was five years ago, and about half the tonnage of virgin metal produced last year.

This would indicate that the flow of scrap, especially from automotive plants back into consumption has been impressively quickened in the last few years. Specifications against old contracts and small lot buying by automotive consumers are good. Prices are unchanged all along the line and steady.

Copper—The copper market is devoid of life. Connecticut Valley brass mills appear to be well provided with copper. Automotive demand for copper and brass products has improved.

Tin—The market seesaws within narrow bounds, consumers being apathetic.

Lead—It looks as though the market had settled down for a period of relative calm. Storage battery manufacturers appear to have provided for their April requirements.

Zinc—Galvanizing demand shows more pep and the market is slightly more animated. Stocks are comfortable.

Refining Changes to Cut Oil Price

WASHINGTON, March 23—A series of tests just made by the U. S. Bureau of Mines and the American Petroleum Institute, on the range of lubricating oils for automotive equipment, has resulted in the conclusion that good lubricating oils for cars and trucks can be made from crude oil that is not specially refined for this purpose—all with the resultant conclusion that such motor car lubricants will and can be sold cheaper.

There must be some processing, of course, the bureau points out, "but the experimental work indicates that for use in automotive equipment lubricating oils need not be refined to as high a degree as for use in turbines and similar machinery and as a result considerable savings therefore may be made in present oil-refining processes."

"What is a good lubricating oil?" the bureau asks, and likewise answers "that a good lubricating oil for an internal combustion engine can be considered as giving good service if it lubricates effectively, if with its use there is minimum danger of lubrication failure, and if its consumption is not excessive."

The results of the tests are contained in a brochure, known as "Technical Paper 387, of the U. S. Bureau of Mines," and copies may be had for 15 cents for those interested by writing the bureau.

Packard Gets Navy Award

DETROIT, March 19—The United States Navy has awarded a contract to the Packard Motor Car Co. to provide 45 Packard 2-A-1500 engines, capable of 600 hp. each for use in the Loening amphibian airplanes and in P. N.-10 seaplanes. The contract totals \$609,492.

Evinrude Buys Koban

MILWAUKEE, March 19—The Evinrude Motor Co. has acquired the entire interests of the Koban Mfg. Co., and is consolidating operation in the Evinrude plant. The Koban lines include both outboard and inboard engines.

Michigan Protests Women Labor Bills

Manufacturers and Employees Show Protection Ample Without New Legislation

DETROIT, March 21—Introduction of labor bills before the Michigan Legislature now in session at Lansing, designed to curb the employment of women in manufacturing plants, has created considerable interest in the automotive industry.

When the legislation was brought before the Senate labor committee, a delegation of women employed in factories and representing the vast army of factory-employed women in Michigan, appeared with an appeal not to pass the law. They argued that it would force a large percentage of them out of their jobs.

Representatives of a number of manufacturing concerns also appeared before the committee with an appeal that the proposed law be side-tracked, arguing that women are never employed in operating a dangerous machine or one causing injurious dust. Should the bill now before the Legislature pass, women would be barred from working on any machine where wheels or belts are used for grinding or polishing.

Representatives of automotive companies, who appeared with other manufacturers to protest were: Robert Green, Champion Porcelain Co.; Paul Beardsley, Piston Ring Co.; D. H. Bonnett, Ternstedt Mfg. Co., and Arthur W. Blodgett, Metal Trades Association, Grand Rapids.

Servel Company Reelects Officers and Directors

EVANSVILLE, IND., March 19—H. G. Scott was reelected president; J. J. Brown was named senior vice-president, and Fred P. Nehrbas, vice-president and general manager, of the Servel Corp. of New York, and the Servel Mfg. Co., at a meeting of officers and directors held here. With the exception of Mr. Nehrbas, who was elected to succeed Amos Ely, retired, all the directors were reelected.

"Business prospects this year are much better than last year, and we believe this will be the best year we have ever had," Mr. Scott declared. The company is planning for a national convention of Servel representatives in April. The gathering is expected to bring some 500 Servel men from every section of the United States and Canada.

Gardner Sales Up 38%

ST. LOUIS, March 21—Retail sales of Gardner Motor Co., Inc., cars in the first two months of the year show an increase of 38 per cent over the same months of 1926, according to a factory statement.

Men of the Industry and What They Are Doing

McKim Joins Hercules as Director of Sales

C. D. McKim has been appointed vice-president in charge of sales and advertising of the Hercules Corp., Canton. Mr. McKim has been with the Continental Motors Corp. for 12 years, resigning as Continental's sales manager to take up his new work.

In 1911 he entered the employ of Fairbanks-Morse & Co., and was first stationed in the assembly and test department. In the following year he was promoted to the railway motor car division in the engineering department. He joined the engineering department of the Continental organization in the spring of 1915, and, in 1916, entered the sales department of that company. Mr. McKim was promoted to sales manager in 1920.

Young Ends Business Trip

DuBois Young, president and general manager of Hupp Motor Car Corp., has returned to Detroit from a three weeks' trip along the Pacific Coast. Mr. Young asserted that eight-cylinder cars are advancing with increasing rapidity in public favor. Since the first of the year Mr. Young has journeyed from the Atlantic to the Pacific coast, during which time he has conferred with more than 500 Hupmobile representatives. From his observations he predicts that this will be the greatest year Hupmobile has ever enjoyed.

Bauer to Show Films

Motion picture films, showing how buses and trucks are used by American railroads in coordinating rail and motor service will be shown by George F. Bauer, secretary of the foreign trade committee of the National Automobile Chamber of Commerce, during his four months' speaking tour of South American countries. The films are being produced under direction of J. V. Lawrence, of the N. A. C. C.

Graham Named Secretary

Keith D. Graham has been elected secretary of the Root Co., Bristol, Conn., rising to this position after an association with the company since 1916 when he began work as a stock clerk. For the past year Mr. Graham has been in charge of production.

Fawick Talks to S. A. E.

Thomas L. Fawick, noted inventor, addressed the March meeting of the Milwaukee section, S. A. E., on "The Possibilities of Step-up Transmissions and Their Construction."

Koether Returns From Trip

B. G. Koether, head of the sales committee of the General Motors Corp., and Mrs. Koether, are back in Detroit after a month's cruise to the West Indies.

AUSTRALIANS SEE DETROIT PLANTS

A party of 20 Australian manufacturers will spend a week in Detroit inspecting plants in the automotive industry. During the first three days they will be guests of General Motors Corp. and will be taken to the Cadillac factory, the General Motors Proving Grounds, Oakland and Pontiac plants at Pontiac, Buick and Chevrolet at Flint.

On Thursday the party visits Dodge Brothers and Monday will be given over to visiting the Ford factories and Tuesday they will be entertained by the Packard Motor Car Co.

Higginbottom Promoted

Oakland Motor Car Co. has appointed Hugh Higginbottom, head of the newly created department of distribution, as director of distribution. Mr. Higginbottom will supervise all dealer relations and activities so far as the home office is concerned. Previous to his appointment he was director of the department of field operations.

Joining the Oakland organization in the fall of 1924, he was made Chicago district manager and was later taken into the home offices at Pontiac as head of the department of field operations. Previous to joining Oakland he was connected with the Dodge Brothers sales organization for 14 years. During the first 10 years he organized and managed the transportation department at the Dodge Brothers factory in Detroit and later became their Seattle district manager, having charge of sales in the Pacific Northwest. He resigned his position there to become associated with General Motors Corp., through the Oakland division.

Lincoln Managers Changed

Lincoln Electric Co. reports the appointment of G. N. Bull, formerly of Worthington Pump & Machinery Co., as district manager of the New York office. C. S. Freeman has been made district manager at Buffalo and is succeeded at Lancaster, Pa., by S. W. Shultz, formerly of the Philadelphia office. E. J. Pfister has been transferred from the Buffalo office to Philadelphia.

Jay Joins Detroit Gear

Harold Jay has been appointed general sales manager of the Detroit Gear & Machine Co. Previous to his appointment Mr. Jay was associated with the Acklin Stamping Co. of Toledo, for eight years, resigning as sales manager of that company to become affiliated with the Detroit concern.

Reeves Visits Detroit to Study Spring Outlook

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, is in Detroit on a two weeks' visit to the various automobile plants. In addition to addressing the Detroit Real Estate Board and other groups, he is conferring with the companies on plans for spring business, which is reported to be excellent.

Russel Huffman, secretary of the Motor Vehicle Conference Committee and secretary of the legislative committee of the chamber, is attending the American Automobile Association convention in Washington.

John C. Long, manager of the educational department, has just returned from Washington, where he has been conferring with government officials, gathering data for the 1927 edition of "Facts and Figures of the Automobile Industry," which will be published May 1.

Litle Heads S.A.E. Committee

T. J. Litle, Jr., chief engineer of Marmon Motor Car Co., has been appointed chairman of the technical advisory committee of the Society of Automotive Engineers to cooperate with the contest board of the American Automobile Association in arousing the interest of automotive engineers to the importance of racing and the effect of racing car design upon the future design of passenger cars.

Sparks Adds to Sales Force

Additions to the sales staff of the Sparks-Withington Co. include D. W. Murray, formerly of the Michelin Tire Co., C. J. Hayes, R. S. Williams and I. H. Tusing, all of whom have had wide experience in the automotive sales field. Mr. Hayes has been definitely assigned to the Middle West territory and Mr. Tusing to the Southwest.

Kansas City Company to Make Dart Truck

KANSAS CITY, March 19—Kansas City has entered the truck manufacturing field with the organization here of the Dart Truck Co. The company, headed by T. H. Cooper of Wichita, Kan., with M. W. Cline as factory manager, has purchased the patent rights, goodwill, etc., of the old Dart truck factory at Waterloo, Iowa.

A new factory building is now being erected by the company and will be ready for use early next month. Meanwhile, trucks are being manufactured by the company in limited quarters at the rate of about one a week.

The old Dart truck was built in 1½ ton, 2½ ton and 3½ ton capacities. The new company is manufacturing a 2 and 3 ton truck.

Germany Rules Out High-Duty on Parts

Dismissal of Ruling Permits Continuance of American Assembly Plants

WASHINGTON, March 23—The ruling of the German Ministry of Finance of March 9, which provided that automobile parts of all kinds would be subject to the same import duty as finished vehicles, was set aside on March 17, according to a cablegram received in the Department of Commerce from Acting Commercial Attache Douglas Miller at Berlin, and made public here this week.

Whether the interested governments have brought pressure to bear to effect this change of heart, or whether such a tariff increase has been ruled out as a violation of the present trade treaties, is not known.

The manager of the Ford Berlin plant, which is assembling 25 cars a day, was informed by a minor official of the German finance department that it could continue operations without fear of further trouble and that a favorable official interpretation would be given within a few days.

It is admitted that the proposed 134-fold increase in the tariff would have compelled Ford to close its Berlin assembling plant and Chrysler and General Motors to discontinue plans for opening plants in the near future. The order would have also cut out the sales of other foreign cars in Germany.

There is a rumor that the finance department ordered the tariff on spare parts to be raised at the behest of the Union of German Automobile Manufacturers, which last summer spread propaganda extensively against foreign cars, and Herr Bale's letters to the German people asking them to patronize the home industry.

One of these letters asked purchasing agents or firms not to admit into their offices salesmen who arrived in automobiles made outside the Reich.

Continental Officers Visit Trade in Plane

DETROIT, March 21—Ross W. Judson, president, and W. R. Angell, executive vice-president of the Continental Motors Corp. left this week on a 6000 mile trip, by airplane, calling on Continental customers. The trip will be made in the corporation's three-engined Fokker plane, which was purchased eight months ago and which has been used in the company's service making regular trips between Continental plants in Detroit and Muskegon.

The first stop will be at St. Louis, after which the party will continue West, stopping at Springfield, Mo., Kansas City, Tulsa, Oklahoma City, Santa Fe, New Mexico and then to Los Angeles. After a brief stay there the party will fly north to San Francisco

and Oakland. The return to Detroit will include stops at Salt Lake City, Omaha, Des Moines and Chicago.

Officials of Continental have been interested in commercial aviation for several years and for the past year the company has been developing a series of engines for airplanes.

Kansas Forfeiture Law Upheld by Supreme Court

WASHINGTON, March 19—The United States Supreme Court this week inferentially upheld the Kansas statutes forfeiting the rights of mortgage holders on automobiles which have been confiscated while carrying liquor.

The construction of the statute provides for the confiscation of vehicles as common nuisances when used in the unlawful transportation of intoxicating liquors. The court in effect upheld the Federal district court's decision forfeiting the mortgage holder's rights and sustained the state's contention that the statute did not violate the constitution because the mortgage holder lost his interest in the car, which was sold on the instalment plan.

Aircraft Exports Show 33% Increase in 1926

WASHINGTON, March 19—Exports of aircraft products from the United States during last year were valued at \$1,038,929, compared with \$783,000 shipped abroad in 1925. The exports in 1926 included 85 planes, 855 engines and \$150,000 worth of parts. The number of engines sold abroad during the year increased during the year 11 times, compared with 1925. The United Kingdom was the leading market for American exports, taking \$281,000. Second place was held by Soviet Russia in Europe, which imported \$270,000.

British Tire Exports Gain

WASHINGTON, March 23—British exports of automobile casings from the United Kingdom to foreign countries during January totaled 88,485 as compared with 82,080 in December. The leading markets, in the order named, were: British India, Argentina, Brazil, British South Africa, Australia, Denmark, Irish Free State and Mexico.

Extends Bearings Service

DETROIT, March 19—The Federal Mogul Corp. announces that it has taken over the entire distribution of the Shoemaker Model D connecting rod bearing machine, and will distribute these machines to its distributors to be used for rebabbitting connecting rods.

To Show Tire Equipment

NEW YORK, March 19—The De Mattia book-type individual vulcanizing molds and other tire manufacturing equipment of De Mattia make will be introduced to European tire manufacturers by Dr. Irwin Meyer and A. Schoen, who sailed this week for Europe.

Financial Notes

Wright Aeronautical Corp. for the year ended Dec. 31, 1926, reports net income of \$700,688 after depreciation, Federal taxes, etc., equivalent to \$2.80 a share earned on 250,000 shares of no part capital stock. This compares with \$710,832 or \$2.85 a share in 1925.

American Bosch Magneto Corp. reports for year ended Dec. 31, 1926, profit of \$448,319 after depreciation, etc., equivalent to \$2.16 a share earned on 207,399 shares of no par stock. This compares with \$521,393 or \$2.51 a share in 1925.

Ajax Rubber Co., Inc., and subsidiaries for 1926 shows net loss of \$292,808 after interest, depreciation and adjustments. This compares with net profit of \$1,005,069, or \$2.01 a share, on 500,000 no par shares in 1925.

Doehler Die Casting Co. reports net profit of \$541,528 for 1926 after all charges, equal to \$3.27 a share on 150,000 shares of common stock. This compares with \$444,716 or \$2.67 a share in 1925.

Reo Motor Car Co. declared the regular quarterly dividend of 20 cents, payable April 1 to stock of record March 15. Three months ago an extra dividend of 20 cents was declared.

National Acme Co. reported net profit of \$207,721 for 1926 after depreciation and other charges but before Federal taxes. This compares with \$573,402 in 1925.

Mason Tire & Rubber Co. profit for the year ended Dec. 31, 1926, was \$401,904 after charges but before Federal taxes, comparing with \$165,960 in 1925.

C. G. Spring & Bumper Co. will pay its regular quarterly dividend of 2 per cent, April 1, to stock of record, March 10.

Pyrene Mfg. Co. for the year ended Dec. 31, 1926, shows net profit of \$348,411 after federal taxes, comparing with \$318,894 in 1925.

Set Plate Glass Hearings

WASHINGTON, March 21—Hearings before the United States Tariff Commission with reference to duties on plate glass will be held on May 9, it has just been announced by the commission. It is expected that representatives of the automobile industry will be heard. The commission announces that those desiring to be heard will be given an opportunity to testify.

Rules Magneto Duty 25%

WASHINGTON, March 23—Imported signal horns and magnetos for automobiles are properly dutiable at 25 per cent ad valorem under paragraph 368, Act of 1922, as parts for automobiles, according to a decision announced this week by the Department of Justice, sustaining a contention of the Bosch Magneto Co. The custom's collector at New York has assessed a higher rate, which duty is set aside under the court's ruling.

N.A.C.C. Outlines Traffic Conference

NEW YORK, March 21—A preliminary program of the City Traffic Conference, to be held in Chicago April 13 and 14, has been announced by the National Automobile Chamber of Commerce, which is sponsoring the event.

Although the conference is to be mainly a round-table discussion by mayors and other city officials, speakers will introduce the various subjects and tours of the city illustrating the different points will follow.

The topics and speakers so far assigned are: "Traffic Survey Methods"—Miller McClintock, Albert Russel Erskine Bureau for Street Traffic Research; "Signals and Signs,"—E. J. McIlraith, Chicago Surface Lines; "How to Get the City Bus Plans Into Effect,"—Eugene S. Taylor, Chicago Plan Commission; "Metropolitan Planning"—Robert Kingery, Chicago Regional Planning Association, and "Enforcement End of Traffic,"—Judge Charles L. Bartlett, Detroit.

Garages and how to handle parking will also be taken up.

Forging Meeting in May

PITTSBURGH, March 21—The annual convention of the American Drop Forging Institute will be held at French Lick Springs Hotel, French Lick, Ind., May 17 to 19. C. H. Smith, president of the Steel Improvement & Forge Co., is chairman of the convention committee.

Willys Adds 96 Dealers

TOLEDO, March 21—Willys-Overland, Inc., announces the appointment of 96 new dealers between Feb. 15 and Mar. 1. Nearly all parts of the United States are represented in this new list.

Coming Feature Issues of Chilton Class Journal Publications

May 1—Automobile Trade Journal—Annual Big Small Town Market Number.

May 5—Motor Age—Annual Sales and Service Reference Number.

Car Parts Firms to Help Simplify Revenue Laws

WASHINGTON, March 19—The automobile and accessory manufacturers of the country have been invited to have a representative attend a meeting to be held here in April, with representatives of other associations, to aid in simplifying the revenue laws of the country. The invitation was issued this week by Representative Green of Iowa, chairman of the Joint Committee on Internal Revenue Taxation and of the House Ways and Means Committee.

It is proposed to simplify tax collections under the Internal Revenue Act and members of the industry are invited to submit such ideas as they may have. The communications should be addressed to Charles D. Hamel, Legal Counsel and Chief of the Division of Simplification, Room 321-A, House Office Building, this city.

Melbourne Show in May

WASHINGTON, March 21—The Third Melbourne International Motor Show, under the auspices of the Chamber of Automotive Industries will open in Melbourne, Australia, in May and continue for nine days. To date 125 exhibitors have applied for space, of which a majority are American manufacturers.

Kansas City Gets New Airport Site

KANSAS CITY, March 19—An agreement has been reached on the three-year lease of the 687 acres between North Kansas City and the Missouri River on the west to be used for an airport that will be known as Richards Field Airport. The Chamber of Commerce is ready to begin construction of a new hangar on the field as soon as authorities announce that the field is ready. The chamber is obligated to provide hangar space for one year to the mail carriers, National Air Transport, Inc.

The assurance was given here by the chief engineer of National Air Transport, that as soon as the municipal airport was established his company would establish passenger plane service between St. Louis and Kansas City and possibly other points.

Sanction A.A.A. Agreement

PARIS, March 8 (by mail)—Baron de Zuylen and Colonel Peron as president and secretary of the International Association of Recognized Automobile Clubs, this week affixed their signatures to the agreement reached between the American Automobile Association and the Automobile Club of America. Under this agreement the A.A.A. will have a seat on the international body, American speed records will be admitted in Europe and the interchange of cars and drivers will be facilitated.

Boyle to Race Two Cars

CHICAGO, March 19—Boyle Valve Co. announces it has purchased another racing car which will be entered in the Indianapolis race this year. This car will be known as a Boyle Special and will make the second car of that name entered for the 1927 500-mile race.

Calendar of Coming Events

SHOWS

Atlantic City	June 4-10
Exhibition, Million Dollar Pier, National Electric Light Association.	
Barcelona	April 27-May 8
Budapest	June 4-15
Cleveland	Sept. 19-23
Exposition, Public Auditorium, National Machine Tool Builders' Ass'n.	
Cleveland	Oct. 3-7
Exhibition Public Auditorium, American Electric Railway Ass'n.	
Cologne	May 20-31
International Commercial Transport Exhibition.	
London	Oct. 14-22
Olympia Passenger Car Show.	
London	Nov. 17-26
Olympia Truck Show.	
Melbourne	May
International Motor Show.	
New Haven, Conn.	Sept. 6-9
Machine Tool Exhibition.	
Paris	Oct. 6-16
Grand Palais.	
Riga	April 10-17

CONVENTIONS

American Automobile Association, Annual Meeting, Ritz-Carlton Hotel, Philadelphia	June 16-17
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American Electric Railway Association, Public Auditorium, Cleveland.	Oct. 3-7
American Gear Manufacturers Association, Annual Meeting, Hayes Hotel, Jackson, Mich.	May 12-14
American Society of Mechanical Engineers, White Sulphur Springs, W. Va.	May 23-26
American Welding Society, Engineering Societies Bldg., New York City	April 27-29
Associated Automotive Engine Builders, Hotel Winton, Cleveland	May 26-28
Automotive Equipment Association Summer Convention, Multnomah Hotel, Portland, Ore.	June 27-July 2
Chamber of Commerce of the United States of America, Washington	May 2-5
National Association of Automobile Show and Association Managers, Drake Hotel, Chicago	July 26-27
National Automobile Chamber of Commerce, Bus Meeting, New York	May 31
National Automobile Chamber of Commerce, Annual Meeting, New York	June 2
National Electric Light Association, Million Dollar Pier, Atlantic City	June, 6-10

National Foreign Trade Council, Hotel Statler, Detroit	May 25-27
National Highway Traffic Association, Automobile Club of America, New York	April 15
National Safety Council, Stevens Hotel, Chicago	Sept. 26-30
Society of Automotive Engineers, Summer Meeting, French Lick Springs, Ind.	May 25-28

RACES

Abilene, Texas	July 4
Altoona, Pa.	June 11
Altoona, Pa.	Sept. 5
Atlantic City	May 7
Atlantic City	Sept. 24
Belgian Grand Prix, Spa-Francorchamps	July 9-10
British Grand Prix, Brooklands	Oct. 1
Charlotte, N. C.	July 18
Detroit	Sept. 10
French Grand Prix, Monthery	July 3
Indianapolis	May 30
Los Angeles	Nov. 27
Salem, N. H.	June 25
Salem, N. H.	Oct. 12
Syracuse, N. Y.	Sept. 3
Targa Florio, Sicily	April 24